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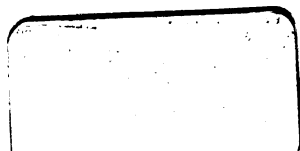
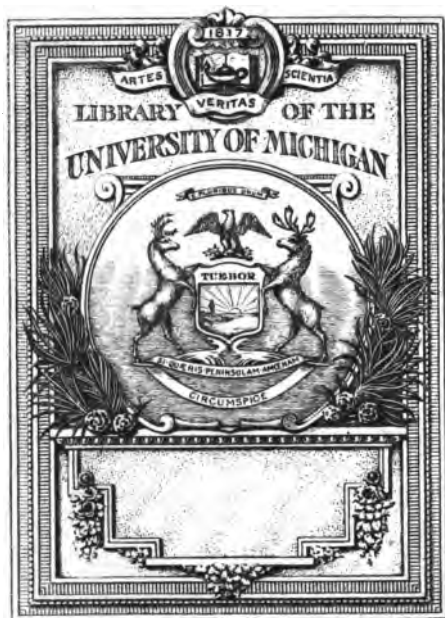
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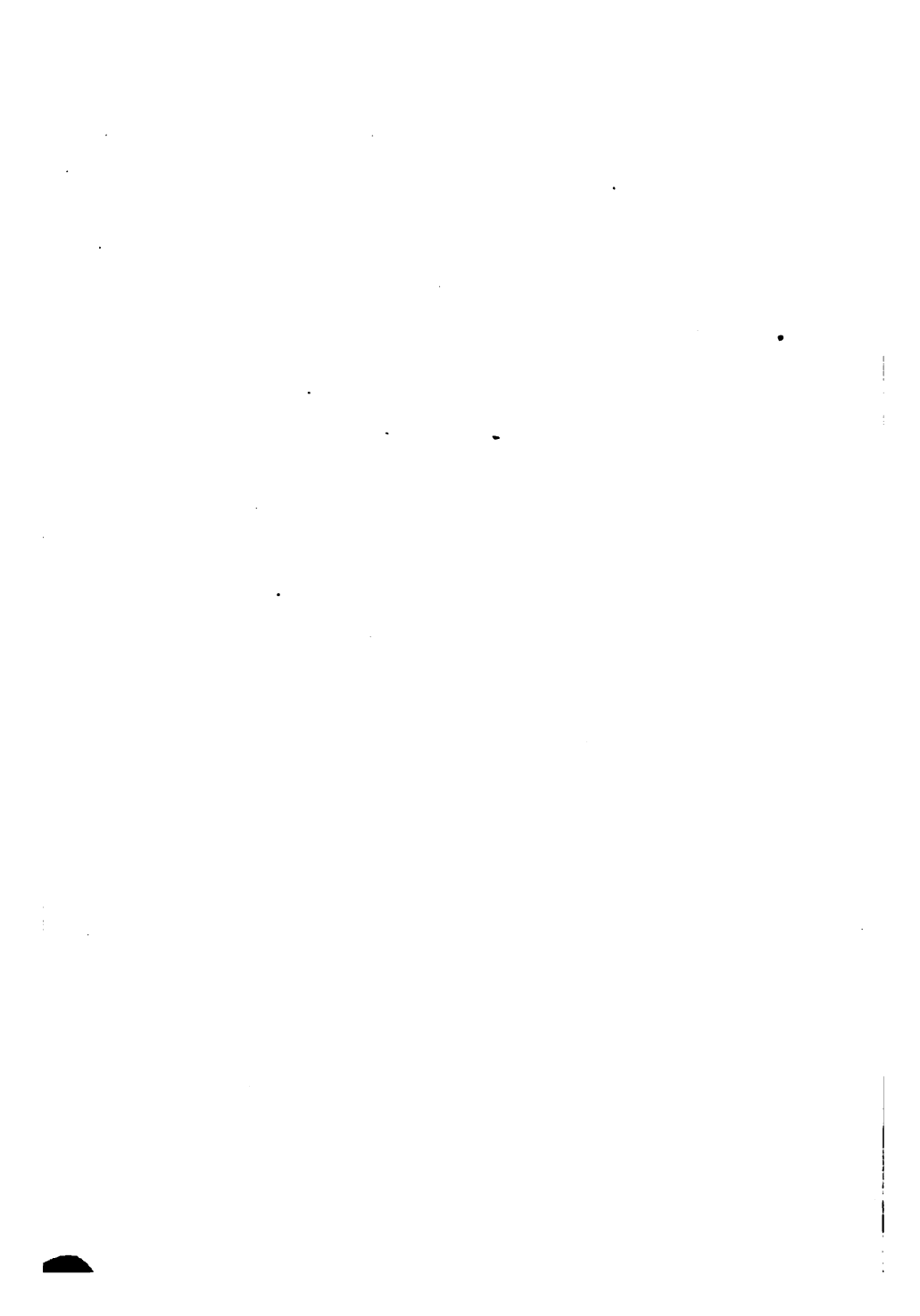
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THE YEAR-BOOK
FOR
COLORISTS & DYERS

PRESENTING A REVIEW OF THE YEAR'S
ADVANCES IN THE BLEACHING, DYEING,
PRINTING, AND FINISHING OF TEXTILES

BY
HERMAN A. METZ



VOLUME VIII

NEW YORK
1905

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PREFACE



In this volume of the Year Book for Colorists and Dyers are collected most of the novelties and improvements relating to dyestuffs and coloring matters and their use which have appeared in the year 1905. The author trusts that those interested will find it of use.

HERMAN A. METZ.

122 HUDSON STREET, NEW YORK CITY, MARCH, 1906.

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PART I

Reference Tables



Reference Tables

THE METRIC SYSTEM, WITH EQUIVALENTS.

The entire metric system of weights and measures is based upon a fundamental unit called a meter, which is the ten-millionth part of the distance from the equator to the pole, and is the principal unit of linear measure.

The ARE, or unit of square measure, is a square whose side is 10 meters.

The STERE, or unit of cubic measure, is a cube whose edge is a meter.

The LITER, or unit of all measures of capacity, is a cube whose edge is the tenth of a meter.

The GRAM or unit of weight, is the weight of a cube of pure water at its greatest density, the edge of which is the hundredth part of a meter.

Elements of the System.

Length.	Surface.	Capacity.	Weight.	Notation.
Myriameter. Kilometer. Hectometer. Decameter.	Hectare. Decare.	Kiloliter. Hectoliter. Decaliter.	Metric ton. Quintal. Myriagram. Kilogram. Hectogram. Decagram.	1,000,000 100,000 10,000 1,000 100 10
<i>Meter.</i> Decimeter. Centimeter. Millimeter.	<i>Are.</i> Centiare.	<i>Liter.</i> Deciliter. Centiliter. Milliliter.	<i>Gram.</i> Decigram. Centigram. Milligram.	1 .1 .01 .001

Year-Book for Colorists and Dyers

Linear, or Long Measure.

	Meters.	Inches.	Feet.	Yards.	Miles.
Millimeter .....	.001	.08937	.00328	.00109	.....
Centimeter .....	.01	.3937	.03280	.01093	.....
Decimeter .....	.1	3.937	.32808	.10936	.00006
Meter	1	¹ 39.37	3.28083	1.093611	.00062
Decameter	10	.....	32.80833	10.93611	.00621
Hectometer	100	.....	328.0833	109.3611	.06213
Kilometer	1,000	.....	3280.833	1093.611	.62137
Myriameter	10,000	.....	.....	.....	6.2137

¹ 39.37 inches is the legalized equivalent of the meter in the United States. The exact equivalent is 39.37079 inches.

Square Measure.

	Square Meters.	Square Inches.	Square Feet.	Square Yards.	Acres.
Milliare .....	.1	155	1.0764	.1196	.....
Centiare, or square meter ..	1	1550	10.764	1.196	.....
Deciare	10	.....	107.64	11.96	.0024
Are, or square decameter ..	100	.....	1076.4	119.6	.0247
Decare	1,000	.....	.....	1196	.2471
Hectare	10,000	.....	.....	.....	2.471

A square centimeter equals 0.155 square inches, a square decimeter 15.5 square inches, and a square kilometer 0.386 square miles.

Cubic Measure.

	Cubic Meters.	Cubic Inches.	Cubic Feet.	Cubic Yards.
Millistere, or cubic decimeter .....	.001	61.023	.035314	.....
Centistere .....	.01	610.23	.35314	.01308
Decistere .....	.1	.....	3.5314	.1308
Stere, or cubic meter	1	.....	35.314	1.308
Decastere	10	.....	353.14	13.08
Hectostere	100	.....	.....	130.8

Reference Tables

Measure of Capacity.

	Liters.	Fluid Ounces.	Quarts.	Gallons.	Bushels.
Milliliter, or cubic centimeter .....	.001	.0388	.00106	.....	.....
Centiliter .....	.01	.388	.01057	.00264	.....
Deciliter .....	.1	3.88	.10567	.02642	.002838
Liter, or cubic decimeter	1	33.8	1.0567	.26417	.028377
Decaliter	10	338	10.567	2.6417	.283774
Hectoliter	100	.....	105.67	26.417	2.83774
Kiloliter	1,000	.....	.....	264.17	28.3774
Myrialiter	10,000	.....	.....	2641.7	283.774

A liter of water at its maximum density weighs a kilogram.

Weight.

	Grams.	Grains.	Ounces Avoirdupois.	Pounds Avoirdupois.	Tons of 2240 Pounds.
Milligram .....	.001	.01543	.....	.....	.....
Centigram .....	.01	.15432	.....	.....	.....
Decigram .....	.1	1.54324	.0035	.....	.....
Gram	1	15.43236	.0353	.0022	.....
Decagram	10	154.2356	.3527	.0220	.....
Hectogram	100	1,543.23564	3.5274	.22046	.....
Kilogram	1,000	15,432.35639	35.274	2.20462	.000984
Myriagram	10,000	.....	.....	22.0462	.009842
Quintal	100,000	.....	.....	220.462	.09842
Millier, or tonneau.	1,000,000	.....	.....	2204.62	.9842

COMPARISON OF METRIC SYSTEM WITH THE UNITED STATES METHOD OF WEIGHTS AND MEASURES.

(Arranged in Alphabetical Order.)

Are (100 square meters)=119.6 square yards.

Bushel = 2150.42 cubic inches, 35.24 liters.

Centare (1 square meter)=1550 square inches.

Centigram (1/100 gram)=0.1543 grain.

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Centiliter (1/100 liter)=2.71 fluid drams, 0.338 fluid ounce.

Centimeter (1/100 meter)=0.3937 inch.

1 Cubic centimeter = 16.23 minims (Apothecaries).

10 Cubic centimeters = 2.71 fluid drams (Apothecaries).

30 Cubic centimeters = 1.01 fluid ounces (Apothecaries).

100 Cubic centimeters = 3.38 fluid ounces (Apothecaries).

473 Cubic centimeters = 16.00 fluid ounces (Apothecaries).

500 Cubic centimeters = 16.90 fluid ounces (Apothecaries).

1000 Cubic centimeters = 33.81 fluid ounces (Apothecaries).

Decigram (1/10 gram)=1.5432 grains.

Decimeter (1/10 meter)=3.937 inches.

Deciliter (1/10 liter)=0.845 gill.

Dekagram (10 grams)=0.3527 ounce.

Dekaliter (10 liters)=9.08 quarts (dry), 2.6418 gallons.

Dekameter (10 meters)=393.7 inches.

Dram (Apothecaries or Troy)=3.9 grams.

Foot = 0.3048 meter, or 30.48 centimeters.

Gallon = 3.785 liters.

Gill = 0.118295 liter, or 142 cubic centimeters.

Grain (Troy)=0.064804 gram.

Grain = 0.0648.

Gram = 15.432 grains.

Hectare (10,000 square meters)=2.471 acres.

Hectogram = 3.5274 ounces.

Hectoliter (100 liters)=2.838 bushels, or 26.418 gallons.

Hectometer (100 meters)=328 feet 1 inch.

Hundredweight (112 pounds Avoirdupois)=50.8 kilograms.

Inch = 0.0254 meter.

Inch = 2.54 centimeters.

Inch = 25.40 millimeters.

Kilogram = 2.2046 pounds, or 35.274 ounces.

Kiloliter (1000 liters)=1.308 cubic yards, or 264.18 gallons.

Kilometer (1000 meters)=0.62137 mile (3280 feet 10 inches).

Liter = 1.0567 quarts, 0.264 gallon (liquid), or 0.908 quart (dry).

Meter = 39.3700 inches, or 3.28083 feet.

Reference Tables

Mile = 1.609 kilometers.
Mile = 5280 feet, or 1609.3 meters.
Millier or tonneau = 2204.6 pounds.
Milligram = 0.0154 grain.
Millimeter (1/1000 meter) = 0.0394 inch.
Myriagram = 22.046 pounds.
Myriameter (10,000 meters) = 6.2137 miles.
Ounce (Avoirdupois) = 28.350 grams.
Ounce (fluid) = 28.3966 cubic centimeters.
Ounce (Troy or Apothecaries) = 31.104 grams.
Peck = 9.08 liters.
Pint (liquid) = 0.47318 liter.
Pound (Avoirdupois) = 453.603 grams.
Pound (English) = 0.453 kilogram.
Pound (Troy) = 373.25 grams.
Quart (liquid) = 0.94636 liter.
Quintal = 220.46 pounds.
Scruple (Troy) = 1.296008 grams.
Ton = 20 hundredweight = 2240 pounds (Avoirdupois) 1016.070 kilograms.
Yard = 0.9144 meter.

TABLE OF MULTIPLES.

Centimeters \times 0.3937 = inches.
Centimeters \times 0.0328 = feet.
Centimeters, cubic, \times 0.0338 = apothecaries' fluid ounces.
Diameter of a circle \times 3.1416 = circumference.
Gallons \times 3.785 = liters.
Gallons \times 0.833565 = imperial gallons.
Gallons, imperial, \times 1.199666 = U. S. gallons.
Gallons \times 8.33505 = pounds of water.
Gallons, imperial, \times 10 = pounds of water.
Gallons, imperial, \times 4.54102 = liters.
Grains \times 0.0648 = grams.
Inches \times 0.0254 = meters.

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Inches $\times 25.4$ = millimeters.

Miles $\times 1.609$ = kilometers.

Ounces, Troy, $\times 1.097$ = ounces of avoirdupois.

Ounces, avoirdupois, $\times 0.9115$ = ounces Troy.

Pounds, avoirdupois, $\times 0.4536$ = kilograms.

Pounds, avoirdupois, $\times 0.8228572$ = pounds Troy.

Pounds, Troy, $\times 0.37286$ = kilograms.

Pounds, Troy, $\times 1.21527$ = pounds avoirdupois.

Radius of a circle = $6.283185 \times$ circumference.

Square of the radius $\times 3.1416$ = area.

Square of the circumference of a circle $\times 0.07958$ = area.

MISCELLANEOUS MEASURES.

Barrel of flour = 196 pounds.

Barrel of salt = 280 pounds.

Bale of cotton (in America) = 400 pounds.

Bale of cotton (in Egypt) = 90 pounds.

Bag of Sea Island cotton = 300 pounds.

Cable = 120 fathoms.

Can = 35 pounds.

Cask of lime = 240 pounds.

Fathom = 6 feet.

Hand = 4 inches.

Hogshead = 63 gallons.

Keg (nails) = 100 pounds.

Noggin or Nog. = $\frac{1}{16}$ of a pint.

Pace = 3.3 feet.

Palm = 3 inches.

Pipe = 2 hogsheads.

Stone = 14 pounds.

Tun = 2 pipes.

Cubic foot of water weighs 62.4 pounds.

Cubic foot of water is 7.48 gallons.

Gallon of water weighs $8\frac{1}{8}$ pounds.

Gallon of water is 231 cubic inches.

Reference Tables

In England, wool is sold by the sack, or boll, of 22 stones, which, at 14 pounds to the stone, is 308 pounds.

A pack of wool is 17 stones and 2 pounds, which is rated as a pack load for a horse. It is 240 pounds.

Sack of flour = 280 pounds.

A tod of wool is 2 stones of 14 pounds.

A wey of wool is $6\frac{1}{2}$ tods. Two weys, a sack.

A clove of wool is half a stone.

THERMOMETRY.

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
-10	-23.33	13	-10.56	36	2.22
-9	-22.78	14	-10.00	37	2.78
-8	-22.22	15	-9.44	38	3.33
-7	-21.67	16	-8.89	39	3.89
-6	-21.11	17	-8.33	40	4.44
-5	-20.56	18	-7.78	41	5.00
-4	-20.00	19	-7.22	42	5.56
-3	-19.44	20	-6.67	43	6.11
-2	-18.89	21	-6.11	44	6.67
-1	-18.33	22	-5.56	45	7.22
0	-17.78	23	-5.00	46	7.78
1	-17.22	24	-4.44	47	8.33
2	-16.67	25	-3.89	48	8.89
3	-16.11	26	-3.33	49	9.44
4	-15.56	27	-2.78	50	10.00
5	-15.00	28	-2.22	51	10.56
6	-14.44	29	-1.67	52	11.11
7	-13.89	30	-1.11	53	11.67
8	-13.33	31	-0.56	54	12.22
9	-12.78	32	-0.00	55	12.78
10	-12.22	33	0.56	56	13.33
11	-11.67	34	1.11	57	13.89
12	-11.11	35	1.67	58	14.44

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Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
59	15.00	93	33.89	127	52.78
60	15.66	94	34.44	128	53.34
61	16.11	95	35.00	129	53.89
62	16.67	96	35.56	130	54.45
63	17.22	97	36.11	131	55.00
64	17.78	98	36.67	132	55.56
65	18.33	99	37.22	133	56.12
66	18.89	100	37.78	134	56.67
67	19.44	101	38.34	135	57.23
68	20.00	102	38.89	136	57.78
69	20.56	103	39.45	137	58.34
70	21.11	104	40.00	138	58.89
71	21.67	105	40.56	139	59.45
72	22.22	106	41.12	140	60.00
73	22.78	107	41.67	141	60.56
74	23.33	108	42.23	142	61.12
75	23.89	109	42.78	143	61.67
76	24.44	110	43.34	144	62.23
77	25.00	111	43.89	145	62.78
78	25.56	112	44.45	146	63.34
79	26.11	113	45.00	147	63.89
80	26.67	114	45.56	148	64.45
81	27.22	115	46.22	149	65.00
82	27.78	116	46.67	150	65.56
83	28.33	117	47.23	151	66.12
84	28.89	118	47.78	152	66.67
85	29.44	119	48.34	153	67.23
86	30.00	120	48.89	154	67.78
87	30.56	121	49.45	155	68.34
88	31.11	122	50.00	156	68.89
89	31.67	123	50.56	157	69.45
90	32.22	124	51.12	158	70.00
91	32.78	125	51.67	159	70.56
92	33.33	126	52.23	160	71.12

Reference Tables

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
161	71.67	195	90.56	229	109.44
162	72.23	196	91.12	230	110.00
163	72.78	197	91.67	231	110.55
164	73.34	198	92.23	232	111.11
165	73.89	199	92.78	233	111.67
166	74.45	200	93.34	234	112.22
167	75.00	201	93.89	235	112.78
168	75.56	202	94.44	236	113.33
169	76.12	203	95.00	237	113.89
170	76.67	204	95.55	238	114.44
171	77.23	205	96.11	239	115.00
172	77.78	206	96.67	240	115.55
173	78.34	207	97.22	241	116.11
174	78.89	208	97.78	242	116.67
175	79.45	209	98.33	243	117.22
176	80.00	210	98.89	244	117.78
177	80.56	211	99.44	245	118.33
178	81.12	212	100.00	246	118.89
179	81.67	213	100.55	247	119.44
180	82.23	214	101.11	248	120.00
181	82.78	215	101.67	249	120.55
182	83.34	216	102.22	250	121.11
183	83.89	217	102.78	251	121.67
184	84.45	218	103.33	252	122.22
185	85.00	219	103.89	253	122.78
186	85.56	220	104.44	254	123.33
187	86.12	221	105.00	255	123.89
188	86.67	222	105.55	256	124.44
189	87.23	223	106.11	257	125.00
190	87.78	224	106.67	258	125.55
191	88.34	225	107.22	259	126.11
192	88.89	226	107.78	260	126.67
193	89.45	227	108.33	261	127.22
194	90.00	228	108.89	262	127.78

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Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
263	128.33	264	128.89	266	130.00
		265	129.44		

A method to transform Fahrenheit to Centigrade, or *vice versa*, is the formula:

$$\frac{C \times 9}{5} + 32 \text{ equals Fahrenheit.}$$

$$F - 32 \times \frac{5}{9} \text{ equals Centigrade.}$$

Comparison Between the Scales of Fahrenheit, Réaumur, and the Centigrade.

(Zero Fahrenheit corresponds with minus 17.78 Centigrade and minus 14.22 Réaumur.)

Cent.	Fahr.	Rmr.	81	177.8	64.8
100	212	80	80	176	64.
99	210.2	79.2	79	174.2	63.2
98	208.4	78.4	78	172.4	62.4
97	206.6	77.6	77	170.6	61.6
96	204.8	76.8	76	168.8	60.8
95	203	76	75	167	60
94	201.2	75.2	74	165.2	59.2
93	199.4	74.4	73	163.4	58.4
92	197.6	73.6	72	161.6	57.6
91	195.8	72.8	71	159.8	56.8
90	194	72	70	158	56
89	192.2	71.2	69	156.2	55.2
88	190.4	70.4	68	154.4	54.4
87	188.6	69.6	67	152.6	53.6
86	186.8	68.8	66	150.8	52.8
85	185	68	65	149	52
84	183.2	67.2	64	147.2	51.1
83	181.4	66.4	63	145.4	50.4
82	179.6	65.6	62	143.6	49.6

Reference Tables

Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
61	141.8	48.8	27	80.6	21.6
60	140	48	26	78.8	20.8
59	138.2	47.2	25	77	20
58	136.4	36.4	24	75.2	1.2
57	134.6	45.6	23	73.4	18.4
56	132.8	44.8	22	71.6	17.6
55	131	44	21	69.8	16.8
54	129.2	43.2	20	68	16
53	127.4	42.4	19	66.2	15.2
52	125.6	41.6	18	64.4	14.4
51	123.8	40.8	17	62.6	13.6
50	122	40	16	60.8	12.8
49	120.2	39.2	15	59	12
48	118.4	38.4	14	57.2	11.2
47	116.6	37.6	13	55.4	10.4
46	114.8	36.8	12	53.6	9.6
45	113	36	11	51.8	8.8
44	111.2	35.2	10	50	8
43	109.4	34.4	9	48.2	7.2
42	107.6	33.6	8	46.4	6.4
41	105.8	32.8	7	44.6	5.6
40	104	32	6	42.8	4.8
39	102.2	31.2	5	41	4
38	100.4	30.4	4	39.2	3.2
37	98.6	29.6	3	37.4	2.4
36	96.8	28.8	2	35.6	1.6
35	95	28	1	33.8	0.8
34	93.2	27.2	Zero	32	Zero
33	91.4	26.4	—1	30.2	—0.8
32	89.6	25.6	—2	28.4	—1.6
31	87.8	24.8	—3	26.6	—2.4
30	86	24	—4	24.8	—3.2
29	84.2	23.2	—5	23	—4
28	82.4	22.4	—6	21.2	—4.8

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Cent.	Fahr.	Rmr.	Cent.	Fahr.	Rmr.
—7	19.4	—5.6	—29	—20.2	—23.2
—8	17.6	—6.4	—30	—22	—24
—9	15.8	—7.2	—31	—23.8	—24.8
—10	14	—8	—32	—25.6	—25.6
—11	12.2	—8.8	—33	—27.4	—26.4
—12	10.4	—9.6	—34	—29.2	—27.2
—13	8.6	—10.4	—35	—31	—28
—14	6.8	—11.2	—36	—32.8	—28.8
—15	5	—12	—37	—34.6	—29.6
—16	3.2	—12.8	—38	—36.4	—30.44
—17	1.4	—13.6	—39	—38.2	—31.2
—18	—	—14.4	—40	—40	—32
—19	—2.2	—15.2	—41	—41.8	—32.8
—20	—4	—16	—42	—43.6	—33.6
—21	—5.8	—16.8	—43	—45.4	—34.4
—22	—7.6	—17.6	—44	—47.2	—35.2
—23	—9.4	—18.4	—45	—49	—36
—24	—11.2	—19.2	—46	—50.8	—36.8
—25	—13	—20	—47	—52.6	—37.6
—26	—14.8	—20.8	—48	—54.4	—38.4
—27	—16.6	—21.6	—49	—56.2	—39.2
—28	—18.4	—22.4			

Reference Tables

AREOMETRY OR HYDROMETRY.

COMPARISON BETWEEN THE SPECIFIC GRAVITY OF BEAUME AND TWADDLE.

Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.	Tw.	B.	Sp.Gr.
0	0	1.000	44	26.0	1.220	88	44.1	1.440	132	57.4	1.660
1	0.7	1.005	45	26.4	1.225	89	44.4	1.445	133	57.7	1.665
2	1.4	1.010	46	26.9	1.230	90	44.8	1.450	134	57.9	1.670
3	2.1	1.015	47	27.4	1.235	91	45.1	1.455	135	58.2	1.675
4	2.7	1.020	48	27.9	1.240	92	45.4	1.460	136	58.4	1.680
5	3.4	1.025	49	28.4	1.245	93	45.8	1.465	137	58.7	1.685
6	4.1	1.030	50	28.8	1.250	94	46.1	1.470	138	58.9	1.690
7	4.7	1.035	51	29.3	1.255	95	46.4	1.475	139	59.2	1.695
8	5.4	1.040	52	29.7	1.260	96	46.7	1.480	140	59.5	1.700
9	6.0	1.045	53	30.2	1.265	97	47.1	1.485	141	59.7	1.705
10	6.7	1.050	54	30.6	1.269	98	47.4	1.490	142	60.0	1.710
11	7.4	1.055	55	31.1	1.275	99	47.8	1.495	143	60.2	1.715
12	8.0	1.060	56	31.5	1.280	100	48.1	1.500	144	60.4	1.720
13	8.7	1.065	57	32.0	1.285	101	48.4	1.505	145	60.6	1.725
14	9.4	1.070	58	32.4	1.290	102	48.7	1.510	146	60.9	1.730
15	10.0	1.075	59	32.8	1.295	103	49.0	1.515	147	61.1	1.735
16	10.6	1.080	60	33.3	1.300	104	49.4	1.520	148	61.4	1.740
17	11.2	1.085	61	33.7	1.305	105	49.7	1.525	149	61.6	1.745
18	11.9	1.090	62	34.2	1.310	106	50.0	1.530	150	61.8	1.750
19	12.4	1.095	63	34.6	1.315	107	50.3	1.535	151	62.1	1.755
20	13.0	1.100	64	35.0	1.320	108	50.6	1.540	152	62.3	1.760
21	13.6	1.105	65	35.4	1.325	109	50.9	1.545	153	62.5	1.765
22	14.2	1.115	66	35.8	1.330	110	51.2	1.550	154	62.8	1.770
23	14.9	1.115	67	36.2	1.335	111	51.5	1.555	155	63.0	1.775
24	15.4	1.120	68	36.6	1.340	112	51.8	1.560	156	63.2	1.780
25	16.0	1.125	69	37.0	1.345	113	52.1	1.565	157	63.5	1.785
26	16.5	1.130	70	37.4	1.350	114	52.4	1.570	158	63.7	1.790
27	17.1	1.135	71	37.8	1.355	115	52.7	1.575	159	64.0	1.795
28	17.7	1.140	72	38.2	1.360	116	53.0	1.580	160	64.2	1.800
29	18.3	1.145	73	38.6	1.365	117	53.3	1.585	161	64.4	1.805
30	18.8	1.157	74	39.0	1.370	118	53.6	1.590	162	64.6	1.810
31	19.3	1.155	75	39.4	1.375	119	53.9	1.595	163	64.8	1.815
32	19.8	1.168	76	39.8	1.380	120	54.1	1.600	164	65.0	1.820
33	20.3	1.165	77	40.1	1.385	121	54.4	1.605	165	65.2	1.825
34	20.9	1.170	78	40.5	1.390	122	54.7	1.610	166	65.5	1.830
35	21.4	1.175	79	40.8	1.395	123	55.0	1.615	167	65.7	1.835
36	22.0	1.180	80	41.2	1.400	124	55.2	1.620	168	65.9	1.840
37	22.5	1.185	81	41.6	1.405	125	55.5	1.625	169	66.1	1.845
38	23.0	1.150	82	42.0	1.410	126	55.8	1.630	170	66.3	1.850
39	23.5	1.165	83	42.3	1.415	127	56.0	1.635	171	66.5	1.855
40	24.0	1.200	84	42.7	1.420	128	56.3	1.640	172	66.7	1.860
41	24.5	1.205	85	43.1	1.425	129	56.6	1.645	173	67.0	1.865
42	25.0	1.210	86	43.4	1.430	130	56.9	1.650			
43	25.5	1.215	87	43.8	1.435	131	57.1	1.655			

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TO CHANGE FROM TWADDLE SCALE TO SPECIFIC GRAVITY, OR FROM GRAVITY TO TWADDLE SCALE.

In order to change degrees Twaddle into specific gravity, multiply by 5, add 1000, and divide by 1000. Example: Change 168° Twaddle into specific gravity.

$$\begin{array}{r} 168 \times 5 \\ \hline 840 \\ 1,000 \\ \hline 1,000 \overline{) 1.840} \\ \hline 1.84 \text{ Spec. Grav.} \end{array}$$

To change specific gravity into degrees Twaddle, multiply by 1000, subtract 1000, and divide by 5. Example: Change 1.84 specific gravity into degrees Twaddle.

$$\begin{array}{r} 1.84 \times 1,000 \\ \hline 1,840 \\ 1,000 \\ \hline 5 \overline{) 840} \\ \hline 168^\circ \text{ Tw.} \end{array}$$

The degrees of Twaddle's hydrometer are easily turned into specific gravity numbers—a quality which makes it preferable to any other hydrometer in use. The rule is to multiply the indicated degree by 5, and add 1000 to the product; for example, 9 degrees Twaddle equals specific gravity 1045; 25 degrees Twaddle equals specific gravity 1125; 100 degrees Twaddle equals specific gravity 1500; and so on. To bring specific gravity numbers to degrees of Twaddle, subtract 1000, and divide the remainder by 5; for example: specific gravity 1000 degrees equals 20 degrees Twaddle.

Reference Tables

If the sample is too viscous to determine the density directly, a weighed portion of it can be first diluted with a weighed quantity of water, or a weighed portion can be dissolved and diluted to a known volume with water. In the first instance the per cent. of total solids is to be calculated by the following formula:

$$\text{Per cent. of solids in the undiluted material} = \frac{WS}{W}$$

S = per cent. of solids in the diluted material.

W = weight of the diluted material.

w = weight of the sample taken for dilution.

If the dilution was made to a definite volume, the following formula is to be used:

$$\text{Per cent. of solids in the undiluted material} = \frac{VDS}{w}$$

V = volume of the diluted solution.

D = specific gravity of the diluted solution.

S = per cent. of solids in the diluted solution.

w = weight of the sample taken for dilution.

To reduce a liquid to a desired specific gravity:

Let v equal the volume of the first liquid.

Let B equal the Beaumé of the first liquid.

Let b equal the Beaumé of the second or reducing liquid.

Let a equal the Beaumé required.

Let z equal the volume of the reducing liquid.

$$z = \frac{av - vB}{b - a}$$

SULPHURIC ACID.

The Manufacturing Chemists' Association have adopted the following figures as representing the per cent. of H_2SO_4 in an oil of vitriol. Since colorists rarely or never need to look up an acid

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below 80 per cent. oil of vitriol, the table only goes to that degree.

Beaumé.	Sp. Gr.	H ₂ SO ₄ .	Oil Vitrol.
66	1.835	93.50	100
65	1.814	88.82	95
64	1.793	86.30	92
63	1.775	84.50	89
62	1.767	83.21	87
61	1.727	79.47	85
60	1.705	77.60	83
59	1.683	75.73	81

SPECIFIC GRAVITY OF ACETIC ACID SOLUTIONS 15° C.

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0007	1	1.0256	18
1.0022	2	1.0270	19
1.0037	3	1.0284	20
1.0052	4	1.0298	21
1.0067	5	1.0311	22
1.0083	6	1.0324	23
1.0098	7	1.0337	24
1.0113	8	1.0350	25
1.0127	9	1.0363	26
1.0142	10	1.0375	27
1.0157	11	1.0388	28
1.0171	12	1.0400	29
1.0185	13	1.0412	30
1.0200	14	1.0424	31
1.0214	15	1.0436	32
1.0228	16	1.0447	33
1.0242	17	1.0459	34

Reference Tables

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0470	35	1.0725	68
1.0481	36	1.0729	69
1.0492	37	1.0733	70
1.0502	38	1.0737	71
1.0513	39	1.0740	72
1.0523	40	1.0742	73
1.0533	41	1.0744	74
1.0543	42	1.0746	75
1.0552	43	1.0747	76
1.0562	44	1.0748	77
1.0571	45	1.0748	78
1.0580	46	1.0748	79
1.0589	47	1.0748	80
1.0598	48	1.0747	81
1.0607	49	1.0746	82
1.0615	50	1.0744	83
1.0623	51	1.0742	84
1.0631	52	1.0739	85
1.0638	53	1.0736	86
1.0646	54	1.0731	87
1.0653	55	1.0726	88
1.0660	56	1.0720	89
1.0666	57	1.0713	90
1.0673	58	1.0705	91
1.0679	59	1.0696	92
1.0685	60	1.0686	93
1.0691	61	1.0674	94
1.0697	62	1.0660	95
1.0702	63	1.0644	96
1.0707	64	1.0625	97
1.0712	65	1.0604	98
1.0717	66	1.0580	99
1.0721	67	1.0553	100

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NOTE.—The specific gravity 1.0553 may indicate either of two solutions of different strengths. To determine whether an acid is stronger than 78 per cent. (the maximum specific gravity) some water is added; if the specific gravity rises it is stronger, if it falls it is weaker than 78 per cent. acid.

SPECIFIC GRAVITY OF HYDROCHLORIC ACID SOLUTIONS.

Specific Gravity.	Degrees Beaumé.	Per cent. HCl.
1.005	0.7	1.15
1.010	1.4	2.14
1.015	2.1	3.12
1.020	2.7	4.13
1.025	3.4	5.15
1.030	4.1	6.15
1.035	4.7	7.15
1.040	5.4	8.16
1.045	6.0	9.16
1.050	6.7	10.17
1.055	7.4	11.18
1.060	8.0	12.19
1.065	8.7	13.19
1.070	9.4	14.17
1.075	10.0	15.16
1.080	10.6	16.15
1.085	11.2	17.13
1.090	11.9	18.11
1.095	12.4	19.06
1.100	13.0	20.01
1.105	13.6	20.97
1.110	14.2	21.92
1.115	14.9	22.86
1.120	15.4	23.82
1.125	16.0	24.78

Reference Tables

Specific Gravity.	Degrees Beaumé.	Per cent. HCl.
1.130	16.5	25.75
1.135	17.1	26.70
1.140	17.7	27.66
1.1425	18.0	28.14
1.145	18.3	28.61
1.150	18.8	29.57
1.152	19.0	29.95
1.155	19.3	30.55
1.160	19.8	31.52
1.163	20.0	32.10
1.165	20.3	32.49
1.170	20.9	33.46
1.171	21.0	33.65
1.175	21.4	34.42
1.180	22.0	35.39
1.185	22.5	36.31
1.190	23.0	37.23
1.195	23.5	38.16
1.200	24.0	39.11

FORMALDEHYDE—SPECIFIC GRAVITY OF SOLUTIONS.

Specific Gravity at 15.6°C.	Per cent. by Weight.	Per cent. by Volume.
1.0025	1.0	1.0
1.0125	5.0	5.0
1.0250	10.0	10.25
1.0380	15.0	15.6
1.0530	20.0	21.1
1.0670	25.0	26.7
1.0830	30.0	32.5
1.1040	35.0	38.6
1.1250	40.0	45.0

This table is by W. A. Davis, in the Journal of Society of Chemical Industry, 1897, 502.

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BLEACHING POWDER (CALCIUM HYPOCHLO- RITE) SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Per cent. Available Cl.
1.008	1	0.5
1.015	2	1.0
1.023	3	1.5
1.030	4	2.0
1.037	5	2.5
1.045	6	3.0
1.053	7	3.5
1.060	8	4.0
1.069	9.2	4.5
1.078	10.4	5.0
1.087	11.5	5.5
1.097	12.6	6.0
1.105	13.6	6.4

CALCIUM ACETATE SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degrees Bé.	Per cent. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$.
1.0260	3.4	5
1.0530	7.1	10
1.0792	10.5	15
1.1051	13.6	20
1.1321	16.8	25
1.1594	19.8	30

NITRIC ACID—SPECIFIC GRAVITY AND STRENGTH OF SOLUTIONS AT 0° C.

Specific Gravity.	Degrees Bé.	Per cent. HNO_3 .	Per cent. N_2O_5 .
1.007	1	1.1	0.9
1.014	2	2.2	1.9

Reference Tables

Specific Gravity.	Degrees Bé.	Per cent. HNO ₃ .	Per cent. N ₂ O ₅ .
1.022	3	3.4	2.9
1.029	4	4.5	3.9
1.036	5	5.5	4.7
1.044	6	6.7	5.7
1.052	7	8.0	6.9
1.060	8	9.2	7.9
1.067	9	10.2	8.7
1.075	10	11.4	9.8
1.083	11	12.6	10.8
1.091	12	13.8	11.8
1.100	13	15.2	13.0
1.108	14	16.4	14.0
1.116	15	17.6	15.1
1.125	16	18.9	16.2
1.134	17	20.2	17.3
1.143	18	21.6	18.5
1.152	19	22.9	19.6
1.161	20	24.2	20.7
1.171	21	25.7	22.0
1.180	22	27.0	23.1
1.190	23	28.5	24.4
1.199	24	29.8	25.5
1.210	25	31.4	26.9
1.221	26	33.1	28.4
1.231	27	34.6	29.7
1.242	28	36.2	31.0
1.252	29	37.7	32.3
1.261	30	39.1	33.5
1.275	31	41.1	35.2
1.286	32	42.6	36.5
1.298	33	44.4	38.0
1.309	34	46.1	39.5
1.321	35	48.0	41.1

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Specific Gravity.	Degrees Bé.	Per cent. HNO_3 .	Per cent. N_2O_5 .
1.334	36	50.0	42.9
1.346	37	51.9	44.5
1.359	38	54.0	46.3
1.372	39	56.2	48.2
1.384	40	58.4	50.0
1.398	41	60.8	52.1
1.412	42	63.2	54.2
1.426	43	66.2	56.7
1.140	44	69.0	59.1
1.454	45	72.2	61.9
1.470	46	76.1	65.2
1.485	47	80.2	68.7
1.501	48	84.5	72.4
1.516	49	88.4	75.8
1.524	49.5	90.5	77.6
1.532	50	92.7	79.5
1.541	50.5	95.0	81.4
1.549	51	97.3	83.4
1.559	51.5	100.0	85.7

ALUMINIUM ACETATE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 17° C.

Specific Gravity.	Degrees Bé.	Per cent. Al_2O_3 .
1.012	1.6	0.5
1.025	3.4	1.0
1.038	5.0	1.5
1.050	6.7	2.0
1.062	8.3	2.5
1.074	9.9	3.0
1.086	11.3	3.5
1.098	12.8	4.0
1.100	13.0	4.5

Reference Tables

ALUMINIUM NITRO-ACETATE SOLUTIONS—SPECIFIC GRAVITY AND STRENGTH AT 17° C.

Specific Gravity.	Degrees Bé.	Per cent. Al_2O_3 .
1.012	1.6	0.5
1.025	3.4	1.0
1.039	5.3	1.5
1.054	7.2	2.0
1.068	9.1	2.5
1.083	11.0	3.0
1.097	12.7	3.5
1.112	14.4	4.0
1.126	16.1	4.5
1.141	17.8	5.0
1.156	19.4	5.5
1.160	19.8	5.64

ALUMINIUM SULPHATE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. $\text{Al}_2(\text{SO}_4)_3$.	Specific Gravity.	Per cent. $\text{Al}_2(\text{SO}_4)_3$.
1.0170	1	1.1467	14
1.0270	2	1.1574	15
1.0370	3	1.1668	16
1.0470	4	1.1770	17
1.0569	5	1.1876	18
1.0670	6	1.1971	19
1.0768	7	1.2074	20
1.0870	8	1.2168	21
1.0968	9	1.2274	22
1.1071	10	1.2375	23
1.1171	11	1.2473	24
1.1270	12	1.2573	25
1.1369	13		

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ALUMINIUM CHLORIDE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. Al_2Cl_6 .	Specific Gravity.	Per cent. Al_2Cl_6 .
1.00721	1	1.17092	22
1.01443	2	1.17953	23
1.02164	3	1.18815	24
1.02885	4	1.19676	25
1.03603	5	1.20584	26
1.04353	6	1.21493	27
1.05099	7	1.22406	28
1.05845	8	1.23310	29
1.06591	9	1.24219	30
1.07337	10	1.25184	31
1.08120	11	1.26149	32
1.08902	12	1.27115	33
1.09684	13	1.28080	34
1.10466	14	1.29046	35
1.11248	15	1.30066	36
1.12073	16	1.31086	37
1.12897	17	1.32106	38
1.13721	18	1.33126	39
1.14545	19	1.34146	40
1.15370	20	1.35224	41
1.16231	21	1.35359	41.126

SODA SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Degree Bé.	Per cent. by Weight.	
		Na_2CO_3	$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$.
1.007	1	0.67	1.807
1.014	2	1.33	3.587
1.022	3	2.09	5.637
1.029	4	2.76	7.444
1.036	5	3.43	9.251

Reference Tables

Specific Gravity.	Degree Be.	Per cent. by Weight.	
		Na_2CO_3	$\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O}$.
1.045	6	4.29	11.570
1.052	7	4.94	13.323
1.060	8	5.71	15.400
1.067	9	6.37	17.180
1.075	10	7.12	19.203
1.083	11	7.88	21.252
1.091	12	8.62	23.248
1.100	13	9.43	25.432
1.108	14	10.19	27.482
1.116	15	10.95	29.532
1.125	16	11.81	31.851
1.134	17	12.61	34.009
1.142	18	13.16	35.493
1.152	19	14.24	38.405

GLAUBER'S SALT SOLUTIONS (SODIUM SULPHATE CRYSTALS)—SPECIFIC GRAVITY AT 19° C.

Specific Gravity.	Per cent.	
	$\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$.	Na_2SO_4 .
1.0040	1	0.441
1.0079	2	0.881
1.0118	3	1.323
1.0158	4	1.764
1.0198	5	2.205
1.0238	6	2.646
1.0278	7	3.087
1.0318	8	3.528
1.0358	9	3.969
1.0398	10	4.410
1.0439	11	4.851
1.0479	12	5.292
1.0520	13	5.373
3	33	

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Specific Gravity.	$\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$.	Per cent.	Na_2SO_4 .
1.0560	14		6.174
1.0601	15		6.615
1.0642	16		7.056
1.0683	17		7.497
1.0725	18		7.938
1.0766	19		8.379
1.0807	20		8.820
1.0849	21		9.261
1.0890	22		9.702
1.0931	23		10.143
1.0973	24		10.584
1.1015	25		11.025
1.1057	26		11.466
1.1100	27		11.907
1.1142	28		12.348
1.1184	29		12.789
1.1226	30		13.230

COMMON SALT SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. NaCl.	Specific Gravity.	Per cent. NaCl.
1.00725	1	1.08859	12
1.01450	2	1.09622	13
1.02174	3	1.10384	14
1.02899	4	1.11146	15
1.03624	5	1.11938	16
1.04366	6	1.12730	17
1.05108	7	1.13523	18
1.05851	8	1.14315	19
1.06593	9	1.15107	20
1.07335	10	1.15931	21
1.08097	11	1.16755	22

Reference Tables

Specific Gravity.	Per cent. NaCl.	Specific Gravity.	Per cent. NaCl.
1.17580	23	1.19228	25
1.18404	24	1.20098	26

SODIUM BISULPHITE SOLUTIONS—SPECIFIC GRAVITY AND STRENGTH AT 15° C.

Specific Gravity.	Degrees Bé.	NaHSO ₃ .	Per cent. SO ₂ .
1.008	1	1.6	0.4
1.022	3	2.1	1.3
1.038	5	3.6	2.2
1.052	7	5.1	3.1
1.068	9	6.5	3.9
1.084	11	8.0	4.8
1.100	13	9.5	5.7
1.116	15	11.2	6.8
1.134	17	12.8	7.8
1.152	19	14.6	9.0
1.171	21	16.5	10.2
1.190	23	18.5	11.5
1.210	25	20.9	12.9
1.230	27	23.5	14.5
1.252	29	25.9	15.9
1.275	31	28.9	17.8
1.298	33	31.7	19.6
1.321	35	34.7	22.5
1.345	37	38.0	23.6

SODIUM ACETATE SOLUTIONS—SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	Per cent. NaC ₂ H ₃ O ₂ .	Per cent. NaC ₂ H ₃ O ₂ + 3H ₂ O.
1.0150	3.015	5
1.0310	6.030	10
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Specific Gravity.	Per cent. $\text{NaC}_2\text{H}_3\text{O}_2$.	Per cent. $\text{NaC}_2\text{H}_3\text{O}_2 + 3\text{H}_2\text{O}$.
1.0470	9.045	15
1.0630	12.060	20
1.0795	15.075	25
1.0960	18.090	30
1.1130	21.105	35
1.1305	24.120	40
1.1485	27.135	45
1.1670	30.150	50

SULPHUROUS ACID—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. SO_2 .	Specific Gravity.	Per cent. SO_2 .
1.0028	0.5	1.0302	5.5
1.0056	1.0	1.0328	6.0
1.0085	1.5	1.0353	6.5
1.0113	2.0	1.0377	7.0
1.0141	2.5	1.0401	7.5
1.0168	3.0	1.0426	8.0
1.0194	3.5	1.0450	8.5
1.0221	4.0	1.0474	9.0
1.0248	4.5	1.0497	9.5
1.0275	5.0	1.0520	10.0

STANNIC CHLORIDE SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent. $\text{SnCl}_2 + 2\text{H}_2\text{O}$.	Specific Gravity.	Per cent. $\text{SnCl}_4 + 5\text{H}_2\text{O}$.
1.012	2	1.059	10
1.024	4	1.072	12
1.036	6	1.084	14
1.048	8	1.097	16

Reference Tables

Specific Gravity.	Per cent. $\text{SnCl}_2 + 2\text{H}_2\text{O}$.	Specific Gravity.	Per cent. $\text{SnCl}_4 + 5\text{H}_2\text{O}$.
1.110	18	1.447	58
1.124	20	1.468	60
1.137	22	1.491	62
1.151	24	1.514	64
1.165	26	1.538	66
1.180	28	1.563	68
1.195	30	1.587	70
1.210	32	1.614	72
1.227	34	1.641	74
1.242	36	1.669	76
1.259	38	1.698	78
1.276	40	1.727	80
1.293	42	1.759	82
1.310	44	1.791	84
1.329	46	1.824	86
1.347	48	1.859	88
1.366	50	1.893	90
1.386	52	1.932	92
1.406	54	1.969	94
1.426	56	1.988	96

TANNIN SOLUTIONS—SPECIFIC GRAVITY AT 15° C.

Specific Gravity.	Per cent.	Specific Gravity.	Per cent.
1.0040	1.0	1.0072	1.8
1.0044	1.1	1.0076	1.9
1.0048	1.2	1.0080	2.0
1.0052	1.3	1.0084	2.1
1.0056	1.4	1.0088	2.2
1.0060	1.5	1.0092	2.3
1.0064	1.6	1.0096	2.4
1.0068	1.7	1.0100	2.5

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TARTAR EMETIC SOLUTIONS—STRENGTH AND SPECIFIC GRAVITY AT 17.5° C.

Specific Gravity.	Per cent. SbOKC ₄ H ₄ O ₆ + ½ H ₂ O.	Specific Gravity.	Per cent. SbOKC ₄ H ₄ O ₆ + ½ H ₂ O.
1.005	0.5	1.022	3.5
1.007	1.0	1.027	4.0
1.009	1.5	1.031	4.5
1.012	2.0	1.035	5.0
1.015	2.5	1.038	5.5
1.018	3.0	1.044	6.0

WATER ANALYSIS.

Analyses of water are sometimes reported as parts per million, and sometimes grains per imperial gallon, and sometimes grains per United States gallon. The following table gives all three values:

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
1	0.0700	0.0583	14	0.9800	0.8165
2	0.1400	0.1166	15	1.0500	0.8747
3	0.2100	0.1749	16	1.1200	0.9330
4	0.2800	0.2332	17	1.1900	0.9914
5	0.3500	0.2915	18	1.2600	1.0497
6	0.4200	0.3499	19	1.3300	1.1080
7	0.4900	0.4082	20	1.4000	1.1663
8	0.5600	0.4665	21	1.4700	1.2246
9	0.6300	0.5248	22	1.5400	1.2829
10	0.7000	0.5831	23	1.6100	1.3413
11	0.7700	0.6414	24	1.6800	1.3996
12	0.8400	0.6998	25	1.7500	1.4579
13	0.9100	0.7581	26	1.8200	1.5162

Reference Tables

Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
27	1.8900	1.5745	58	4.0600	3.3824
28	1.9600	1.6329	59	4.1300	3.4407
29	2.0300	1.6912	60	4.2000	3.4990
30	2.1000	1.7495	61	4.2700	3.5573
31	2.1700	1.8078	62	4.3400	3.6157
32	2.2400	1.8661	63	4.4100	3.6740
33	2.3100	1.9244	64	4.4800	3.7323
34	2.3800	1.9828	65	4.5500	3.7909
35	2.4500	2.0411	66	4.6200	3.8489
36	2.5200	2.0994	67	4.6900	3.9073
37	2.5900	2.1577	68	4.7600	3.9656
38	2.6600	2.2160	69	4.8300	4.0239
39	2.7300	2.2745	70	4.9000	4.0822
40	2.800	2.3327	71	4.9700	4.1405
41	2.8700	2.3910	72	5.0400	4.1988
42	2.9400	2.4493	73	5.1100	4.2575
43	3.0100	2.5076	74	5.1800	4.3155
44	3.0800	2.5659	75	5.2500	4.3738
45	3.1500	2.6243	76	5.3200	4.4321
46	3.2200	2.6826	77	5.3900	4.4904
47	3.2900	2.7409	78	5.4600	4.5488
48	3.3600	2.7992	79	5.5300	4.6071
49	3.4300	2.8575	80	5.6000	4.6654
50	3.5000	2.9129	81	5.6700	4.7237
51	3.5700	2.9742	82	5.7400	4.7820
52	3.6400	3.0325	83	5.8100	4.8403
53	3.7100	3.0908	84	5.8800	4.8987
54	3.7800	3.1491	85	5.9500	4.9570
55	3.8500	3.2074	86	6.0200	5.0154
56	3.9200	3.2658	87	6.0900	5.0736
57	3.9900	3.3241	88	6.1600	5.1319

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Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.	Parts per Million.	Grains per Imperial Gallon.	Grains per United States Gallon.
89	6.2300	5.1903	95	6.6500	5.5402
90	6.3000	5.2486	96	6.7200	5.5985
91	6.3700	5.3069	97	6.7900	5.6568
92	6.4400	5.3652	98	6.8600	5.7151
93	6.5100	5.4235	99	6.9300	5.7734
94	6.5800	5.4818	100	7.0000	5.8318

SYMBOLS AND ATOMIC WEIGHTS OF THE ELEMENTS.

Name.	Symbol.	H = 1.	O = 16.	Atomic Weight. Richards.	German.
Aluminum	Al....	26.9	27.1	27.1	27.1
Antimony	Sb....	119.3	120.2	120.0	120.
Argon	A....	39.6	39.9	39.9?	40.
Arsenic	As....	74.45	75.0	75.0	75.
Barium	Ba....	136.4	137.40	137.43	137.4
Bismuth	Bi....	206.9	208.5	208.0	208.5
Boron	B....	10.9	11.0	10.95	11.
Bromine	Br....	79.36	79.96	79.955	79.96
Cadmium	Cd....	111.55	112.4	112.3	112.
Caesium	Cs....	132.	133.	132.9	133.
Calcium	Ca....	39.8	40.1	40.1	40.
Carbon	C....	11.91	12.0	12.001	12.00
Cerium	Ce....	139.	140.	140.	140.
Chlorine	Cl....	35.18	35.45	35.455	35.45
Chromium	Cr....	51.7	52.1	52.14	52.1
Cobalt	Co....	58.55	59.00	59.00	59.
Columbium	Cb....	93.3	94.	94.	94.
(Niobium)					
Copper	Cu....	63.1	63.6	63.60	63.6
Erbium	Er....	164.8	166.0	166.	166.

Reference Tables

Name.	Symbol.	Atomic Weight.			
		H = 1.	O = 16.	Richards.	German.
Fluorine	F....	18.9	19.05	19.05	19.
Gadolinium	Gd....	155.	156.	156.	...
Gallium	Ga....	69.5	70.0	70.0	70.
Germanium	Ge....	71.9	72.5	72.5	72.
Glucinum	Gl....	9.0	9.1	9.1	9.1
(Beryllium)					
Gold	Au....	195.7	197.2	197.3	197.2
Helium	He....	4.	4.	4.0?	4.
Hydrogen	H....	1.000	1.008	1.0075	1.01
Indium	In....	113.1	114.0	114.	114.
Iodine	I....	125.90	126.85	126.85	126.85
Iridium	Ir....	191.5	193.0	193.0	193.
Iron	Fe....	55.46	55.88	56.0	56.
Krypton	Kr....	81.2	81.8	.....	81.8
Lanthanum	La....	137.9	138.9	138.5	138.
Lead	Pb....	205.35	206.92	206.92	206.9
Lithium	Li....	6.98	7.03	7.03	7.03
Magnesium	Mg....	24.1	24.3	24.36	24.36
Manganese	Mn....	54.6	55.0	55.02	55.
Mercury	Hg....	198.50	200.0	200.0	200.3
Molybdenum	Mo....	95.3	96.0	96.0	96.
Neodymium	Ne....	142.5	143.6	143.6	144.
Neon .....	.....	19.9	20.	.....	20.
Nickel	Ni....	58.3	58.70	58.70	58.7
Nitrogen	N....	13.93	14.04	14.045	14.04
Osmium	Os....	189.6	191.0	190.8	191.
Oxygen	O....	15.88	16.000	16.0000	16.00
Palladium	Pd....	105.7	106.5	106.5	106.
Phosphorus	P....	30.77	31.0	31.0	31.
Platinum	Pt....	193.3	194.8	195.2	194.8
Potassium	K....	38.86	39.15	39.140	39.15
Praseodymium	Pr....	139.4	140.5	140.5	140.
Radium	Ra....	223.3	225.

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Name.	Symbol.	Atomic Weight.			
		H = 1.	O = 16.	Richards.	German.
Rhodium	Rh....	102.2	103.0	103.0	103.
Rubidium	Rb....	84.8	85.4	85.44	85.4
Ruthenium	Ru....	100.9	101.7	101.7	101.7
Samarium	Sa....	148.9	150.0	150.0	150.
Scandium	Sc....	43.8	44.1	44.	44.1
Selenium	Se....	78.6	79.2	79.2	79.1
Silicon	Si....	28.2	28.4	28.4	28.4
Silver	Ag....	107.12	107.93	107.930	107.93
Sodium	Na....	22.88	23.05	23.050	23.05
Strontium	Sr....	86.94	87.60	87.68	87.6
Sulphur	S....	31.83	32.06	32.065	32.06
Tantalum	Ta....	181.6	183.0	183.	183.
Tellurium	Te....	126.6	127.6	127.5	127.
Terbium	Tb....	158.8	160.	160.	....
Thallium	Tl....	202.61	204.15	204.15	204.1
Thorium	Th....	230.8	232.5	233.	232.
Thulium	Tm....	169.7	171.0	170.	....
Tin	Sn....	118.1	119.0	119.0	118.5
Titanium	Ti....	47.7	48.10	48.17	48.1
Tungsten	W....	182.6	184.	184.4	184.
Uranium	U....	236.7	238.5	240.	239.5
Vanadium	V....	50.8	51.2	51.4	51.2
Xenon	X....	127.	128.	....	128.
Ytterbium	Yb....	171.7	173.0	173.	173.
Yttrium	Yt....	88.3	89.0	89.0	89.
Zinc	Zn....	64.9	65.4	65.40	65.4
Zirconium	Zr....	89.9	90.6	90.5	90.6



PART II

Identification of Dyestuffs



The Identification of Coloring Matters on Fibres

THE IDENTIFICATION OF DYESTUFFS ON ANIMAL FIBRES.

By Arthur G. Green, M. Sc. F. S. C., F. C. S., assisted by H. Yeoman and J. R. Jones.

The ready identification, by an examination of a textile material, of the dyestuff or dyestuffs with which it has been dyed or printed, is a problem which presents at the present day great difficulties. Twenty or thirty years ago the number of dyestuffs was so small that their identification by an expert was simple enough matter, for the shade alone would usually give a sufficient indication. With the enormous increase both in individual coloring matters and in new groups of coloring matters their detection has been rendered both more necessary and greatly more difficult, since it is now possible to produce any shade in a large variety of ways. The fact that the fastness of such a shade for the purpose in view will depend upon a suitable choice of the dyestuff or dyestuffs renders it particularly important for the dyer in matching a sample submitted, to be able not only to match the shade, but, if necessary, to select the same or similar dyestuffs. It is also a desideratum for the merchant to be able to ascertain whether the color of the material dyed for him is always of constant composition, whether the shade dyed by one firm is or is not a chemical match for that dyed by another, and other similar

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problems. Although an extensive series of tables has been published by Lange, Knecht and Loewenthal, Rawson, Lunge, Gnehm, Heermann, and others, giving the reactions of the individual dyestuffs on the fibre towards acids, alkalies, and stannous chloride, there yet exists a want for a systematic scheme of analysis, without which such tables are of little use. A scheme of this kind should be capable of referring the dyestuff to its chemical group, after which the particular brand may, if necessary, be ascertained by comparing the individual reactions with the published tables. In very many cases, however, sufficient information for the practical dyer would be gained by knowing the group to which the dyestuff belongs, the precise identification of the particular individual not being always necessary.

Although for the present moment the identification of mixtures will be left out of consideration, which is often a most difficult and intricate problem, and this limited to the consideration of single dyestuffs or mixtures of dyestuffs of the same class, yet it appears to be an absolute essential for any scheme of analysis that it should also be capable of extension to all the mixtures which may be encountered in practice. For this reason, only such chemical properties can be employed as group reactions as depend not upon individual peculiarities, but upon general differences in chemical structure, so that dyestuffs of the same family shall be grouped together irrespective of shade. Another reason why such a principle can prove satisfactory is that the scheme must be capable of referring to their respective chemical and dyeing groups the many new coloring matters which are constantly appearing and whose individual reactions are still unknown.

Dyestuffs may be classified in two ways, either according to their dyeing properties, viz., whether basic, acid, salt, mordant, vat, etc., or according to their chemical structure, that is, according to the chromophor they contain; viz., whether they belong to the nitro, nitroso, azo, triphenylmethane, azine, oxazine, thiazine, acridine, pyrone, anthracene, or other groups. In the scheme of

Identification of Coloring Matters

analysis submitted, use has been made, in the first place, of methods for ascertaining the dyeing property of the dyestuffs on the fibre, such tests (so-called "stripping tests") being an inversion of the respective dyeing process. In the second place, in order to ascertain the chemical relationship of the dyestuff, a modification of the method suggested by the author in 1893 for the analysis of dyestuffs in substance has been employed, which depends upon the different behavior of the respective leuco compounds to oxidation. This method consisted in reducing the dyestuff with zinc dust, and reoxidation by air and chromic acid. Whilst nitro, nitroso, and azo compounds were completely destroyed on reduction, those dyestuffs which may be regarded as having an ortho quinonoid structure gave leuco compounds which were readily reoxidized by air to the original dyestuffs, and those to which a para quinonoid structure is attributable gave leuco compounds stable to air but reoxidized by chromic acid. A still further group of dyestuffs were not reducible at all, and the alizarine colors were changed to red or brown but not decolorized.

It has been ascertained that these reactions can be satisfactorily performed upon the wool or silk fibre if sodium hydrosulphite is used as the reducing agent, and potassium persulphate as the oxidizing agent. Contrary to what might have been anticipated, the leuco compounds formed remain in great part attached to the fibre, whilst the splitting-products of the azo dyestuffs can be entirely removed therefrom by washing.

The reactions are therefore in many cases sharper than when carried out in substance, as there is no disturbing factor due to secondary oxidation products. The substitution of a persulphate for chromic acid was found to be advantageous on account of the color of the latter.

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The following is the general behavior of the various chemical groups of dyestuffs upon animal fibres towards reduction and oxidation:

Decolorized by Hydrosulphite.			Not altered by hydrosulphite.	Not discolored, but changed to brown. Original color restored by air or persulphate.
Color restored on exposure to air.	Color not restored by air, but on oxidation with persulphate.	Color not restored either by air or persulphate.		
Azines, Oxazines, Thiazines, Indigo.	Triphenyl-methane group.	Nitro-Nitroso-and Azo-groups.	Pyrone, Acridine, Quinoline, and Thiazol groups. Some members of Anthracene group.	Most dyestuffs of the Anthracene group.

Having ascertained both the dyeing group and the chemical relationship of the coloring matter, and taking the shade also into consideration, the question is usually narrowed down to a single representative or to a choice between a very few closely related dyestuffs. For distinguishing between these the behavior with concentrated sulphuric acid or strong hydrochloric acid can be frequently employed. In the appended tables the sub-division of the groups has been usually omitted as unnecessary, but is given in a few instances (see Table II.) in order to illustrate the general method. For additional confirmation it is well to compare the sample both as to shade and reactions with a dyed pattern of the dyestuff to which it is believed to correspond.

It should be remarked that in a scheme of this description the same degree of definiteness cannot be expected as in a scheme of inorganic analysis, and some variation will be found in the sharpness of the indications with individual dyestuffs. A little practice

Identification of Coloring Matters

and experience will therefore be required before absolute certainty can be obtained.

In the appended tables all the possible groups of dyestuffs are considered, although in individual instances many of them would, be at once excluded on account of the nature of the material or its shade. In such cases, therefore, the analytical scheme may be much simplified.

REAGENTS.

The following reagents are employed. It is important that they be used of the strength indicated:

DILUTE AMMONIA (1:100).

- 1 c.c. conc. ammonia.
- 100 c.c. water (soft or distilled).

AQUEOUS ALCOHOLIC AMMONIA.

- 1 c.c. conc. ammonia.
- 50 c.c. strong alcohol or methylated spirit.
- 50 c.c. water.

DILUTE ACETIC ACID (5%).

- 5 c.c. glacial acetic acid.
- 95 c.c. water.

DILUTE ALCOHOL (1:1).

- 50 c.c. strong alcohol or methylated spirit.
- 50 c.c. water.

DILUTE HYDROCHLORIC ACID (1:10).

- 10 c.c. conc. hydrochloric acid.
- 100 c.c. water.

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CAUSTIC SODA (10%).

10 g. solid caustic soda in
100 c.c. of solution.

HYDROSULPHITE A.

A 10 per cent. solution of hydrosulphite NF (Meister) or hyraedite, *i.e.*, the formaldehyde compound of sodium hydrosulphite. This solution, which is slightly alkaline, is employed in most cases. In a few other cases, however, in which the reduction is more sluggish (*e.g.*, azo yellows), it has been found necessary to employ a slightly acid solution. This is termed

HYDROSULPHITE B.

Prepared by acidifying 200 c.c. of hydrosulphite A with 1 c.c. of glacial acetic acid.

PERSULPHATE.

A cold saturated solution of potassium persulphate.

SODIUM ACETATE (5%).

5 g. crystallized sodium acetate.
100 c.c. water.

PROCEDURE.

The reactions are performed in test-tubes with pieces of the material about $\frac{3}{4}$ in. to 1 in. square, which are covered with about 1 in. to $1\frac{1}{2}$ in. of the reagent. The tests should be carried out exactly as described. In making "stripping tests" the degree of stripping is judged by comparing the depth of shade remaining with that of the original pattern. The color of the stripping solution is misleading, and can scarcely be relied upon as a guide. It

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is found advantageous in boiling with dilute acetic acid and dilute ammonia to repeat the extraction, as a better stripping is thereby obtained, and also with acid dyestuffs any staining of the cotton by the first strong extract is avoided. In testing with dilute ammonia or sodium acetate, the piece is placed in a test-tube with a somewhat smaller piece of white mercerized cotton cloth, and boiled for the time prescribed. If the shade is a pale one, the size of the sample should be increased and that of the cotton diminished. The dilute NH_3 is replaced by aqueous alcoholic NH_3 in the case of the violet and black dyestuffs (Tables III. and VII.), as in these cases the acid dyestuffs are less easily extracted, and the cotton is more liable to be stained by them. In making reduction tests, the sample is boiled for from one-quarter to one minute with the hydrosulphite, then rinsed well under the tap, and allowed to lie on white paper for an hour or so. With most dyestuffs which form air-oxidizable leuco compounds, the color returns immediately or in a few minutes, but with others a longer time is required. The reaction is accelerated by exposing the pattern to ammonia vapor. If the color does not return the pattern is heated to boiling in a test-tube with a little water, and potassium persulphate is added drop by drop, carefully avoiding an excess. If this also fails to cause any return of color, the dyestuff is to be regarded as an azo compound. The depth of the restored color varies greatly in different cases; whilst with some dyestuffs the color reappears with nearly its original depth, with others (probably on account of the greater solubility of their leuco compounds) only a slight shade may return. Safranine and its azo derivatives yield on reoxidation of the leuco compound a violet color. This is due to the condensation of the leuco-safranine with the formaldehyde present in the hydrosulphite NF.

The reactions given in the annexed analytical tables were mostly ascertained upon the wool fibre, but from a number of tests that were also conducted for comparison upon silk, we have no reason to believe that the latter fibre will exhibit any variations in behavior. On the other hand, cotton and vegetable fibres require

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rather different treatment, which will be dealt with in a later paper.

EXAMINATION OF YELLOW OR ORANGE SHADES.

TABLE I.

The fibre may be dyed with one of the following coloring matters:

1. A basic acridine dyestuff, such as Phosphine, Benzoflavine, Rheonine, Acridine Yellow, Acridine Orange, Patent Phosphine, &c.
2. Auramine O and G.
3. Thioflavine T.
4. A basic azo dyestuff, *e.g.*, Chrysoidine, Tannin Orange, New Phosphine or Janus Yellow.
5. Quinoline Yellow, Uranine, Eosine Orange.
6. Tartrazine, Orange G, 2G, R, &c.
7. Naphthol Yellow S, Martius Yellow (nitro group).
8. Fast Yellow, Indian Yellow, Azoflavine, Curcumeine extra, Orange II, Metanil Orange.
9. Metanil Yellow, Orange IV.
10. Thioflavine S, Chromine, Primuline, Chloramine Yellow, Chlorophenine, Diamine Fast Yellow B or FF, Thiazol Yellow, Clayton Yellow, &c. (thiazol group). Also Turmeric.
11. Curcumine S, Direct Yellows, Stilbene, Yellows, Naphthamine Yellows, Mikado Yellows, Diphenyl Citronine, Mikado Oranges, &c. (stilbene group).
12. Chrysophenine Yellow, Chrysamine, Carbazol Yellow, Cresotine Yellow, Diamine Yellows, Benzo Orange, Congo Orange, Diamine Orange, Pluto Orange, Dianil Orange, Toluylene Yellow and Orange, Pyramine Orange, &c. (azo group).
13. Fustic, Quercitron, or Weld (on AL or CR), Alizarine Yellow A, Galloflavine, &c.
14. Alizarine Orange.
15. A mordant azo dyestuff, such as Alizarine Yellow G and R, Anthracene Yellow C, Flavazol, Diamond Flavine, Metachrome Yellow, Metachrome Orange, Chrome Orange, &c.

Identification of Coloring Matters

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

- A. Much color is stripped—Basic dyestuff.

Boil with hydrosulphite B.

- X. Decolorized. Color is not restored by air or by persulphate.

Azo Group No. 4—Chrysoidine, Tannin Orange, Janus Yellow.

- Y. Not decolorized or only very slightly.

Treat fibre with conc. H₂SO₄.

Green fluorescent solution.

Acridine Group No. 1—Phosphine, Orange, &c.

Colorless solution. *Boil with dilute HCl.*

Completely decolorized—No. 2 Auramine.

Fibre and solution of pale yellow—No. 3 Thio Flavine T.

- B. Little or no color is stripped—Acid, Salt or Mordant dyestuff.

Boil twice for one minute with dilute ammonia (:100) and a piece of white cotton. Keep the ammoniacal extract. R

- X. Much color is stripped but cotton remains white. Acid dyestuff.

Boil with hydrosulphite B.

Color is not affected. Quinoline or Pyrone Group No. 5—Quinoline Yellow, Uranine, Eosine Orange. Decolorized and color does not return on exposure to air or upon oxidation with persulphate. Azo or Nitro Group.

Add conc. HCl to the ammoniacal extract.

No change of color. Tartrazine Group No. 6—Tartrazine, Oranges G, 2G, R, &c.

Becomes colorless. Naphthol Yellow S Group No. 7—Naphthol Yellow S and Martius Yellow.

Becomes red. Fast Yellow Group No. 8—Fast Yellow, Indian Yellow, Azoflavine, &c.

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Becomes violet or violet red. Metanil Yellow,
Orange IV, Group No. 9.

Y. Little or no color is stripped.

Cotton remains white or is tinted.

*Boil with 5 per cent. sodium acetate and white cotton
for two to three minutes.*

Cotton is stained—Salt dyestuff.

Boil with hydrosulphite B.

Not affected or slightly changed in shade. Thiazol
Group No. 10—Thioflavine S, Chloramine Yellow,
Chlorophenine Thiazol Yellow, &c.

Decolorized. Color restored by exposure to air or
more quickly by persulphate. Stilbene Group
No. 11—Curcumine S, Mikado Yellows and
Oranges, Stilbene Yellows, &c.

Decolorized. Color not restored by air or by
persulphate. Azo Group No. 12—Chrysophe-
nine Yellow, Benzo, Diamine or Congo Oranges.

Cotton remains white—Mordant dyestuff.

Confirm by testing ash for metallic mordants.

Boil with hydrosulphite A.

Not affected. Flavone and Ketone Group No. 13—
Fustic, Quercitron, Weld, Alizarine Yellow A, &c.
Color changed to yellowish brown. Alizarine
Group No. 14—Alizarine Orange.

Decolorized and color not discharged. Azo Group
No. 15—Alizarine Yellows G & R, Anthracene
Yellow C, Flavazol, Chrome Orange, &c.

EXAMINATION OF RED SHADES. TABLE II.

The fibre may be dyed with one of the following coloring
matters:

1. A basic red or pink of the pyrone group, such as Rhodamines,
Irisamine, Anisoline, Pyronines, Rhodines, &c.

Identification of Coloring Matters

2. A basic red of the azine group, such as Safranine, Induline Scarlet, Rhoduline Red, Rhoduline Pink, &c.
3. A basic red of the triphenylmethane group, *e.g.*, Magenta, Isorubine, Fuchsine, Cerise, &c.
4. A basic azo dyestuff, *e.g.*, Janus Red.
5. A soluble red wood, such as Brazil Wood, Lima Wood, Peach Wood, &c.
6. A phenolic dyestuff of the pyrone group, *e.g.*, Eosine, Phloxine, Erythrosine, Safrosine, Rose Bengal, &c.
7. An acid dyestuff of the pyrone group such as Fast Acid Eosine, Fast Acid Phloxine, Acid Rhodamine, Acid Rosamine, &c.
8. An acid azine, *e.g.*, Azocarmine, or Rosindulines.
9. Acid Magenta (triphenylmethane group).
10. An acid azo scarlet or azo red, such as Xylidine Scarlet, Palatine Scarlet, Fast Reds, Bordeaux, Cloth Reds, Azofuchsine, Lanafuchsine, Sorbin Red, Chromotropes (unchromed), &c.
11. Cochineal Scarlet (tin mordant).
12. Archil (Cudbear).
13. A salt dyestuff, such as Diamine Scarlet, Diamine Red, Benzopurpurine, Hessian Purple, Rosophenine, Erica, Geranines, Anthracene Red, Bordeaux Extra, &c.
14. Cochineal Crimson (Al mordant).
15. Alizarine Reds or Acid Alizarine Reds.
16. An insoluble red wood, such as Camwood or Barwood.
17. A mordant azo color.

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

- A. Color is stripped—Basic dyestuff or Soluble Red Woods.

Boil with dilute alcohol (1:1) twice for one minute.

Unaffected. Al or Cr are present in ash. Boiling with dilute Ammonia renders the color much bluer.

No. 5 Soluble Red Woods.

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Much of the color is stripped—Basic dyestuff.

Boil with hydrosulphite A.

Color not affected. Basic dyestuff of Pyrone Group No. 6.

Decolorized. Color returns quickly on exposure to air—Basic dyestuff of the Azine Group.

Decolorized. Color does not return on exposure to air but is restored by persulphate. Basic dyestuff of the Triphenylmethane Group No. 3.

Decolorized. Color not restored either by air or by persulphate. Basic Azo dyestuff, *e.g.*, Janus Red No. 4.

- B. Little or no color is stripped—Acid, Salt or Mordant dyestuffs.

Boil twice for one minute with dilute ammonia (1:100) and a small piece of white cotton. Keep the ammoniacal extract.

- X. Much color is stripped but cotton remains white—Acid dyestuff.

Boil with hydrosulphite A.

Color of wool is not altered. Pyrone Group No. 6.

Acidify the ammoniacal extract.

Precipitation and disappearance of fluorescence.

No. 6 Eosine, Phloxine, Erythrosine, &c. No. 7 Acid Eosine or Acid Rhodamine.

Decolorized. Color will not return on exposure to air. Azine Group No. 8—Azocarmine or Rosinduline.

Decolorized. Color does not return on exposure to air but is restored by persulphate—Triphenylmethane Group No. 9.

Decolorized. Color not restored either on exposure to air or on oxidation with persulphate. Azo Group.

Identification of Coloring Matters

Boil with dilute bichromate.

Changes to dark maroon or violet black. Chromotropes, Azofuchsine, &c.

- Y. Some of the color is stripped and the wool becomes much bluer.

Boil with hydrosulphite A.

Color slowly changed to deep yellow. Original color not restored on exposure to air. No. 11 Cochineal Scarlet.

Decolorized. Color is quickly restored on exposure to air. No. 12 Archil.

- Z. Little or no color is stripped. The cotton remains white or is stained.

Boil with 5 per cent. sodium acetate and white cotton for two or three minutes.

Cotton is stained—Salt dyestuff.

Test ash for chromium.

Chromium is absent.

Treat fibre with conc. sulphuric acid.

Red Solution—Rosopenine.

Violet Red Solution—Erica or Geranine.

Violet Solution—Diamine Scarlet.

Blue Solution—Diamine Fast Red.

Greenish Blue Solution—Hessian Purple.

Cotton remains white—Mordant dyestuff.

Confirm by testing ash for metallic mordants.

Boil with hydrosulphite A.

Color not affected. Al in ash. No. 14 Cochineal Crimson.

Color slowly changed to yellow or orange. Al in ash. No. 15 Alizarine Reds.

Decolorized. Color is not restored by persulphate.

Al in ash. No. 16 Insoluble Red Woods.

Decolorized. Color is not restored by persulphate.

Cr in ash. No. 17 Mordant Azo Color.

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EXAMINATION OF VIOLET OR PURPLE SHADES.

TABLE III.

The fibre may be dyed with one of the following:

1. A basic violet of the azine, oxazine, or thiazine groups, such as Neutral Violet, Rhoduline Violet, Rosolane, Iris Violet, Tannin Heliotrope, Methylene Violet, &c.

2. A basic violet of the triphenylmethane group, such as Methyl Violet, Crystal Violet, Benzyl Violet, Regina Purple, &c.

3. An acid violet of the pyrone group, *i.e.*, *Fast Acid Violets* or *Violamines*.

4. An acid violet of the triphenylmethane group, *i.e.*, *Acid Violets*, *Formyl Violets*, &c.

5. An alkali violet of the triphenylmethane group.

6. A red shade soluble blue (triphenylmethane group).

7. An acid color of the azine, oxazine or thiazine groups, such as *Induline* or *Fast Blue R*.

8. An acid azo color, such as *Lanacyl Violet*, *Victoria Violet*, &c.

9. A salt dyestuff, such as *Hessian Violet*, *Diamine Violet*, *Oxamine Violet*, *Benzo Fast Violet*, *Columbia Violet*, *Oxydiamine Violet*, *Chlorantine Violet*, &c.

10. *Galleine*.

11. *Alizarine* or iron or chromium mordant.

12. *Alizarine Bordeaux*.

13. Mordant dyestuff of the oxazine group, such as *Gallosyanine*, *Prune*, *Celestine Blue*, &c.

14. *Chrome Violet* (mordant dyestuff of triphenylmethane group).

15. Mordant azo colors.

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

A. Color is nearly completely stripped. Basic dyestuff.

Boil with hydrosulphite A.

Decolorized. The color, returns on exposure to air.

Identification of Coloring Matters

No. 1 Basic Violet of the Azine, Oxazine, or Thiazine Groups.

Decolorized. The color only returns on oxidation with persulphate. Basic violet of Triphenylmethane Group, such as Methyl Violet.

B. Color is not stripped—Acid, Salt and Mordant dyestuffs.

Boil twice for one minute with aqueous alcoholic ammonia and white cotton.

X. Much color is stripped but cotton remains white—Acid dyestuff.

Boil with hydrosulphite A.

Not altered or only partially decolorized—Pyrene Group No. 3, Fast Acid, Violets or Violamines.

Decolorized. The color returns on exposure to air—Azine, Oxazine or Thiazine Group No. 7—Induline or Fast Blue R, &c.

Decolorized. Color does not return on exposure to air or by oxidation with persulphate. Azo Group No. 8—Lanacyl Violet, Victoria Violet, &c.

Decolorized. Color does not return on exposure to air, but is restored upon oxidation with persulphate. Triphenylmethane Group.

The ammoniacal extract is violet or purple. No. 4
Acid Violets, Formyl Violets, &c.

Ammoniacal extract is colorless but becomes violet on acidifying.

Spot fibre with conc. HCL.

Becomes green No. 5—Alkali Violet.

No change—Red Shade Soluble Blues.

Y. Little or no color is stripped. Cotton remains white or is tinted.

Boil with sodium acetate and white cotton for two or three minutes.

Cotton is stained—Salt dyestuff.

No. 9 Hessian Violet, Diamine Violet, &c.

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Cotton remains white—Mordant Color.

Confirm by testing for metallic mordants in ash.

Boil with hydrosulphite A.

Color not altered. Pyrone Group No. 10—Gallein.

Decolorized. Color returns on exposure to air.

No. 13 Gallocyanine, Prune, Celestine Blue, &c.

Decolorized. Color does not return on exposure to air, but is restored by oxidation with persulphate. No. 14 Chrome Violet.

Decolorized. Color is not restored either by exposure to air or by oxidation with persulphate.

No. 15 Mordant Azo Color.

Color changed to brown—Alizarine Group.

Boil with dilute HCL.

Fibre and solution yellow. No. 11 Alizarine.

Fibre and solution red or reddish brown—No. 12 Alizarine Bordeaux.

EXAMINATION OF BLUE SHADES. TABLE IV.

The fibre may be dyed by one of the following color-matters.

1. A basic dyestuff of the azine, oxazine, or thiazine group, such as Methylene Blue, Nile Blue, Capri Blue, Cresyl Blue, Meldola's Blue, &c.

2. A basic safranin-azo color, *e.g.*, Indoin or Janus Blue.

3. A basic dyestuff of the triphenylmethane group, such as Victoria Blue, Night Blue, Brilliant Milling Blue B, &c.

4. Logwood Blue.

5. Indigo Extract or Indigo Carmine (indigo sulphonic acids).

6. Thiocarmine (thiazine group).

7. Prussian Blue.

8. A "Wool" Blue (triphenylmethane group).

9. A dyestuff on the "patent blue" class, such as Patent Blues V, A, or N, Cyanol, Cyanine, Ketone Blues, Erioglaurine, &c. (triphenylmethane group).

10. A soluble or Alkali Blue (rosaniline blue).

Identification of Coloring Matters

11. An acid azo blue, such as Lanacyl Blue, Azo Acid Blue, Azo Merino Blue, Azo Navy Blue, &c.
12. Acid Alizarine Blues (without mordant), such as Alizarine Saphirol, Alizarine Irisole, Alizarine Astrole.
13. A salt dyestuff, such as Diamine, Benzo, Chicago or Dianil Blues, Sulphone Cyanines, &c.
14. Indigo.
15. An Alizarine Cyanine or Anthracene Blue.
16. An Alizarine Blue (anthraquinonequinolines).
17. Brilliant Alizarine Blue (thiazine group).
18. Gallocyanines, Gallocyanine Blue, Celestine Blue, Prune, &c. (oxazine group).
19. Chrome Blue (triphenylmethane group).
20. A mordant azo dyestuff, such as Cyprus Blue, Peri Wool Blue, Anthracene Chrome Blue, Chromotrope Blue, &c.

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

- A. Much color is stripped.

Boil with dilute alcohol twice for one minute.

Unaffected. Al or Cr or both are present in ash.

Blue is changed to brick red on spotting with HCL.

No. 4 Logwood Blue.

Much color is stripped. Basic dyestuff.

Boil with hydrosulphite A.

Decolorized. Original color returns on exposure to air. Azine, Oxazine or Thiazine Group No. 1—Methylene Blue, Nile Blue, Capri Blue, &c.

Decolorized. Violet color returns on exposure to air. Safranin Azo Color No. 2—Indoine or Janus Blue.

Decolorized. Color does not return on exposure to air, but is restored by persulphate. Triphenylthane Group No. 3—Victoria Blue, Night Blue, &c.

- B. Little or no color is stripped—Acid, Salt or Mordant dyestuff.

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Boil twice for one minute with dilute ammonia (1:100) and small piece of white cotton. Keep the ammoniacal extract.

- X. Much color is stripped but cotton remains white—Acid dye-stuff.

Boil with hydrosulphite A.

Decolorized. Color is not restored either by air or by persulphate. Azo Group No. 11—Acid Azo Blue, *e.g.*, Lanacyl Blue.

Not decolorized, but color changed to bluish red. Alizarine Group No. 12—Alizarine Saphirole, Alizarine Astrole, &c.

Decolorized and color restored on exposure to air. Azine, Oxazine, Thiazine and Indigo Group. Also Prussian Blue.

Ammoniacal extract is colorless. Fe in ash. No. 7 Prussian Blue.

Ammoniacal extract is blue and on adding NaOH at once becomes yellow. No. 5 Indigo extract.

Ammoniacal extract is blue and on adding NaOH becomes violet on heating. No. 6 Thiocarmine.

Decolorized. Color does not return on exposure to air but is restored by persulphate. Triphenyl-methane Group.

Ammoniacal extract is colorless but becomes blue on acidifying. No. 10 Soluble or Alkali Blue.

Ammoniacal extract is blue. On boiling with NaOH it becomes colorless. No. 8 Wool Blue.

Ammoniacal extract is blue. On boiling with NaOH it becomes violet. No. 9 Patent Blue.

- Y. Little or no color is stripped. Cotton remains white or is tinted.

Boil with 5 per cent. sodium acetate and white cotton for two or three minutes.

Cotton is stained—Salt dyestuff.

Identification of Coloring Matters

On reduction with hydrosulphite A the color is not restored either by air or persulphate. Azo Group No. 3—Diamine or Benzo Blues, &c.

Cotton remains white.

Boil with a little aniline oil.

Blue solution which on evaporation to dryness leaves a residue which sublimes in violet vapors on heating. No. 14 Indigo.

Solution is light brown or colorless—Mordant dye-stuff. Confirm by testing ash for metallic mordants.

Boil with hydrosulphite A.

Color of wool unaltered. No. 15 Alizarine, Cyanine, or Anthracene Blue.

Color changed to dark brown, becoming blue again on exposure to air. Alizarine Group No. 16—Alizarine Blue (anthraquinonequinoline).

Decolorized. Color does not return on exposure to air, but is restored by persulphate. Triphenylmethane Group No. 19—Chrome Blue.

Decolorized. Color is not restored either by air or persulphate. Azo Group No. 15—Mordant Azo Blue.

Decolorized, but color returns on exposure to air—Oxazine or Thiazine Group.

Treat fibre with conc. H_2SO_4 .

Green Solution No. 17—Brilliant Alizarine Blue.

Violet Solution No. 18—Galloyanines, Celestine Blue, &c.

EXAMINATION OF GREEN SHADES. TABLE V.

Green shades are frequently dyed with mixtures of yellow and blue dyestuffs. The following single dyestuffs also come into consideration:

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1. A basic safranin-azo color, such as Janus Green or Diazine Green.
2. A basic azine, thiazine or oxazine, such as Fast Green M, Azine Green, Capri Green, Methylene Green, &c.
3. A basic triphenylmethane dyestuff, such as Malachite Green, Methyl Green, Brilliant or Ethyl Green, Solid Green, Setoglaurine, &c.
4. An acid azine, oxazine or thiazine, such as Azine Green S.
5. An acid triphenylmethane dyestuff, such as Acid Green, Light Green, Guinea Green, Wool Green, Neptune Green, Naphthalene Green, &c.
6. An acid azo color, *e.g.*, a mixture of an Azo Blue and Azo Yellow.
7. A salt dyestuff, such as Diamine Green, Columbia Green, Chloramine Green, Benzo Green, &c.
8. Coerulein, Alizarine Green S.
9. Alizarine Cyanine Greens, Alizarine Viridine.
10. Alizarine Green G, or B (oxazine group).
11. Nitroso mordant dyestuffs, *e.g.*, Gambine Y, R, and B, Dioxine, Dark Green and Naphthol Green.
12. Azo mordant dyestuffs, such as Diamond Green and Chrome Patent Green.

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

- A. Color is stripped—Basic dyestuff.

Boil with hydrosulphite A.

- X. Decolorized. Dark violet returns on exposure to air.
Safranin Azo Color—No. 1 Janus Green or Diazine Green.

Decolorized. Original color returns on exposure to air. Azine, Oxazine or Thiazine Group—No. 2 Fast Green M, Azine Green, Capri Green, &c.

Decolorized. Color does not return to exposure to air but is restored by persulphate. Triphenylmethane Group No. 3—Malachite Green, Brilliant Green, Setoglaurine, &c.

Identification of Coloring Matters

B. Color is stripped—Acid, Salt or Mordant dyestuff.

Boil twice for one minute with dilute ammonia (1:100) and a small piece of white cotton.

X. Much color is stripped but the cotton remains white. Acid dyestuff.

Boil with hydrosulphite A.

Decolorized. Color returns on exposure to air.

Azine, Oxazine, or Thiazine Group No. 4—Azine Green S.

Decolorized. Color does not return on exposure to air but is restored by persulphate. Triphenylmethane Group No. 5—Acid Greens, Light Green, Guinea Green, Wool Green, &c.

Decolorized. Color is not restored either by air or persulphate. Azo Group No. 6—chiefly mixtures of an Azo Blue and Yellow.

Y. Little or no color is stripped.

Cotton remains white or is stained.

Boil with 5 per cent. sodium acetate and a piece of white cotton.

Cotton is deeply stained—Salt dyestuff. No. 7 Diamine Green, Columbia Green, Chloramine Green, &c.

Cotton remains white—Mordant dyestuff.

Confirm by testing for metallic mordant in ash.

Boil with hydrosulphite A.

Color changes to brown—Alizarine Group.

Original color returns on exposure to air. No. 8 Coeruleine or Alizarine Green S.

Original color does not return on exposure to air but is restored by persulphate. No. 9 Alizarine Cyanine Green or Alizarine Viridine.

Decolorized or changed to light buff.

Color returns on exposure to air—Oxazine or Thiazine Group No. 10—Alizarine Green G or B.

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Color does not return on exposure to air or upon oxidation with persulphate. Nitroso or Azo Group.

Boil with conc. hydrochloric acid.

Fibre and solution light brown—Nitroso Group
No. 11—Gambines, Dioxine, Dark Green,
Naphthol Green.

Fibre blue and solution colorless. Azo Group
No. 12—Diamond Green, Chrome Patent
Green, &c.

EXAMINATION OF BROWN SHADES. TABLE VI.

Brown shades are usually dyed with mixtures of dyestuffs such as reds, oranges, blues, and greens. Even the brown dyestuffs issued by the color manufacturers are to a large extent mixtures. The following scheme is applicable to single dyestuffs or to mixtures composed of two or more dyestuffs of the same group. If dyestuffs of different groups are present (*i.e.*, an azo orange with a blue of the triphenylmethane series), the respective tables must be consulted. The following single dyestuffs come into consideration:

1. Basic Browns, such as Bismarck Browns or Vesuvine.
2. Acid azo colors, such as Acid Brown R, Fast Brown O, Resorcin Brown, Naphthylamine Brown, &c.
3. Salt dyestuffs of the azo group, such as Diamine Browns, Columbia Browns, Toluylene Browns, Dianil Browns, Benzo Browns, Congo Browns, Hessian Browns, Sulphon Browns, &c.
4. Salt dyestuffs of the stilbene group, *e.g.*, Mikado Browns.
5. Anthragallol (Anthracene Brown).
6. Cutch.
7. Chromogen.
8. Mordant azo colors, such as Anthracene Acid Browns, Acid Anthracene Browns, Acid Anthracene Brown, Palatine Chrome Brown, Acid Chrome Brown, Diamond Brown, Metachrome Brown, &c. Also, Maganese Brown.

Identification of Coloring Matters

ANALYSIS.

Boil twice for one minute with 5 per cent. acetic acid.

- A. Much color is stripped—Basic dyestuff.

On boiling with hydrosulphite A decolorized and color does not return on exposure to air or on oxidation with persulphate. Azo Group No. 1—Bismarck Brown.

- B. Little or no color is stripped—Acid, Salt or Mordant dyestuff.

Boil twice for one minute with dilute ammonia.

- X. Much color is stripped—Acid dyestuff.

On boiling with hydrosulphite A decolorized, and color does not return on exposure to air or on oxidation with persulphate. Azo Group No. 2—Acid Brown R, Fast Brown O, &c.

- Y. Little or no color is stripped—Salt or Mordant dyestuff.

Boil for two to three minutes with 5 per cent. sodium acetate and white cotton.

Cotton is stained—Salt dyestuff.

Boil with hydrosulphite A.

Decolorized, but color not restored by air or by persulphate. Azo Group No. 3.

Test ashfer chromium to ascertain if chromed.

Diamine Browns, Benzo Browns, Toluylene Browns, &c.

Decolorized, but color returns slowly on exposure to air, or quickly on oxidation with persulphate.

Stilbene Group No. 4—Mikado Browns.

Cotton remains white—Mordant dyestuff.

Confirm by testing for metallic mordants in ash.

Boil with hydrosulphite A.

Color not changed.

Boil with dilute hydrochloric acid (1:10).

Color is stripped—No. 5 Anthragallol (anthracene Brown).

Color is not stripped—No. 6 Cutch.

Decolorized, or changed to pale buff or light brown.

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Color returns slowly on exposure to air, or quickly on oxidation with persulphate. No. 7 Chromogen.

Color not restored either by air or persulphate. Azo Group No. 8—Anthracene, Acid Browns, Acid Anthracene Brown, Palatine Chrome Brown, &c. Also Manganese Brown.

EXAMINATION OF BLACKS AND GREYS. TABLE VII.

The fibre may be dyed with one of the following:

1. A basic black or grey, such as Diazine Black, Janus Black, Methylene Grey, &c.
2. An acid black, such as Naphthol Black, Naphthylamine Black, Palatine Black, Nerol, Anthracene Black, Azo Acid Black, Azo Merino Black, &c.
3. A salt dyestuff, such as Union Black, Half-wool Black, Columbia Black, Diamine Blacks, Dianil Blacks, Carbide Blacks, &c.
4. A mordant azo dyestuff, such as Anthracene Chrome Blacks, Palatine Chrome Blacks, Chromotropes, Chromate Black, Acid Chrome Blacks, &c.
5. A "vatted" black (indigo and logwood).
6. Logwood black on chromium mordant.
7. Logwood black on iron mordant or Bonsor's Black.
8. Naphthazarine, Alizarine Blacks, or Alizarine Blue Black SW (naphthoquinone group).
9. Diamond Blacks.
10. Alizarine Cyanine Black (anthraquinone group).
11. Aniline Black.

ANALYSIS.

Boil for one minute with 5 per cent. acetic acid.

- A. Much color is stripped—Basic dyestuff.

No. 1 Diazine Black, Janus Black, Methylene Gray, &c.

- B. Color is not stripped—Acid, Salt or Mordant dyestuff.

Boil twice for one minute with aqueous alcoholic ammonia and small piece of white cotton.

Identification of Coloring Matters

- X. Much color is stripped but the cotton remains white—
Acid dyestuff.

On boiling with hydrosulphite A the color is permanently discharged. No. 2 Naphthol Black, Naphthylamine Black, Palatine Black, &c.

- Y. Color is not stripped—Salt and Mordant dyestuffs.

Boil with 5 per cent. sodium acetate and a small piece of white cotton.

Cotton is stained—Salt and Azo Mordant dyestuff. Permanently decolorized by hydrosulphite A.

Test ash for chromium.

Chromium is absent—Salt dyestuffs. No. 3 Union Black, Half-wool Black, Columbia Black, &c.

Chromium is present—Mordant Azo dyestuffs. No. 4 Anthracene Chrome Blacks, Palatine Chrome Black, Chromotropes, &c.

- Z. Cotton remains white. Mordant dyestuffs.

Confirm by testing ash for mordant.

Boil with dilute hydrochloric acid (1:10).

Fibre blue and solution crimson.

Test for indigo by boiling with a little aniline; blue solution which on evaporation to dryness gives residue subliming in violet vapor. No. 5 Vatted black.

Fibre and solution crimson—No. 6 Logwood on Cr.

Fibre and solution pale brown—No. 7 Logwood on Fe, or Bonsor's Black.

Not affected.

Boil with hydrosulphite A.

Becomes brown. Original color returns on exposure to air. No. 8 Naphthazarine, Alizarine Black S, Alizarine Blue Black SW.

Decolorized. Color is not restored by exposure to air or by persulphate. No. 9 Diamond Blacks.

Unaffected.

Treat fibre with conc. H₂SO₄.

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Blue solution No. 10 Alizarine Cyanine Black.

Colorless solution No. 11 Aniline Black.

Although it is not intended, in the present paper, to deal fully with the detection of mixtures, a few general principles may be mentioned here which will be found useful by those who wish to extend the scheme to such cases. If a mixture consists of two or more dyestuffs of the same chemical and dyeing group, it will behave as a whole similarly to a single dyestuff, though sufficient differences will usually exist in the rate of solution or of attack by the group reagents to render it possible to distinguish or even to separate the constituents. Thus a green consisting of a mixture of an acid azo yellow with an acid azo blue will be distinguishable upon careful reduction with hydrosulphite, since the azo blue will be reduced first, and the shade will therefore change from green to yellow before it is decolorized. Neither color will return on oxidation. Further, if such a compound shade be extracted fractionally with dilute ammonia, the yellow is generally stripped first, and may be transferred to another piece of wool for subsequent tests. Mixtures of colors belonging to different groups will usually exhibit at once their diverse composition. For example, a navy blue shade dyed with patent blue and an azo orange will, upon reduction, first change to bright blue, then become colorless; and upon reoxidation with persulphate the blue alone will return. If a mixture of an azine, oxazine, or thiazine dyestuff with a triphenylmethane color has been employed, only the first will return upon exposure of the leuco compound to air, the latter being also restored upon treatment with persulphate. Fractional extraction of the fibre with dilute alcohol or dilute acetic acid can also be employed in many cases to effect a separation or partial separation of the dyestuffs, the extracted color being then transferred to fresh wool or silk, and separately tested.

This paper which is taken from the "Journal of the Society of Dyers and Colorists" is the most systematic work on the subject which has yet appeared. Owing to the necessities of the pages it has been necessary to change the form of the tables but the matter is exactly that of the original.—Ed.

PART III

Patent for the Year 1905

- I. DYESTUFFS AND COLORING-MATTERS
- II. PROCESS OF APPLICATION
- III. CHEMICAL PROCESSES
- IV. MACHINES
- V. MISCELLANEOUS



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I.—DYESTUFFS AND COLORING-MATTERS.

ANTHRAQUINONE DYE AND PROCESS OF MAKING SAME.

Heinrich Weltz, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 779,825, dated January 10, 1905.

The inventor has found that the polyhydroxy-anthraquinone sulpho-acid described in the specification of Letters Patent No. 754,264, March 8, 1904, which can be obtained by acting on anthraquinone-beta-mono-sulpho-acid with concentrated sulphuric acid, mercury or mercuric salts, and nitrous acid in the presence of arsenic acid or phosphoric acid, can be condensed with the sulpho-acids of aromatic amines, which term includes the salts of such sulpho-acids, giving rise to new coloring-matters soluble in water. The condensation can be effected, for example, either in the presence or in the absence of water and with the addition or not of a condensation agent. These coloring matters dye unmordanted wool in bluish-red shades, chrome-mordanted wool in reddish-blue shades, and alumina-mordanted wool in violet shades.

VIOLET SULPHUR DYE AND PROCESS OF MAKING SAME.

Arthur Lüttringhaus, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 779,860, dated January 10, 1905.

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The inventor has discovered that if equimolecular proportions of ortho-ortho-dichlor-para-phenylene-diamin and a phenol be oxidized together the reaction proceeds smoothly and there are obtained large quantities of new indophenols which are stable and which when treated with sulphur and alkali sulphide give rise to new sulphurized dyestuffs which have great coloring power and great affinity for cotton. The said new indophenols can be very easily reduced, and the resulting diphenylamin derivatives can be used instead of the corresponding indophenols in the preparation of the said new sulphurized dyestuffs.

These dyestuffs in sodium-sulfid solutions dye unmordanted cotton greenish-gray to bluish-gray shades, which on exposure to the air rapidly turn deep violet.

SENSITIZING-DYE.

Rudolf Berendes, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 780,741, dated January 24, 1905.

The process for the production of the new materials consists in causing caustic alkalies to act on the ammonium compounds, which can be prepared by heating quinaldin, the homologues, or substituted derivatives thereof with esters of suphonic acids, such as the ethylicester of ethyl sulphonic acid.



the methylic or ethylic ester of benzene or toluene sulfonic acid, or the like. One can also employ a mixture of the above-mentioned ammonium bases with one another or with the corresponding derivatives of quinolin, which can be obtained by the action of esters of sulphonic acids upon quinolin or its derivatives, such as bromoquinolin or the like. The new sensitizing-dyestuff thus produced are dark crystals which dye silk from a faintly-ammoniacal bath red and color the silver compounds of photographic emulsions red, thereby imparting greater sensibility to photographic emulsions for distinct colors of the spectrum.

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ORANGE SULPHUR DYE AND PROCESS OF MAKING SAME.

Richard Gley, of Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 782,905, dated February 21, 1905.

The inventor claims that new sulphurized dyestuffs are formed if mixtures of meta-toluylenediamin and diformyl-para-phenylenediamin are heated together with sulphur at high temperatures. The reaction product is, especially if well pulverized, directly soluble in an aqueous solution of sodium sulphide and dyes cotton clear orange-yellow shades of great intensity.

GREENISH-BLUE ANTHRAQUINONE DYE.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 785,121, dated March 21, 1905.

This invention relates to the manufacture of a new dyestuff which can be obtained by treating with formic aldehyde and sulphuric acid the blue dye obtainable by heating 1-3-dibromo-2-amidoanthraquinone with cupric chlorid, nitrobenzene, and sodium acetate as described in U. S. Patent No. 775,369.

Upon treatment with hydrosulphite of sodium in an alkaline solution the new product is transformed into its hydro compound, a greenish-blue vat being thus obtained which dyes cotton greenish-blue pure and fast shades of a greener tint than those obtained with the aid of the initial material.

GREEN-BLUE ANTHRAQUINONE DYE.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 785,122, dated March 21, 1905.

This invention relates to the manufacture of a new dyestuff which can be obtained by treating with formic aldehyde and sul-

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phuric acid the blue dye obtainable by melting beta-amidoanthraquinone with caustic potash, Patent No. 682,523.

Upon treatment with hydrosulphite of sodium and caustic-soda lye the dyestuff is transformed into its hydro compound, a greenish-blue vat being thus obtained which dyes cotton greenish-blue pure and fast shades.

GREEN ANTHRAQUINONE DYE.

Robert E. Schmidt, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., New York, N. Y. Patent No. 785,123, dated March 21, 1905.

This invention relates to the manufacture of a new dyestuff which can be obtained by treating with formic aldehyde and sulphuric acid the green dyestuff obtainable by heating 1-4-diamido-2-3-dibromoanthraquinone with cupric chlorid, nitrobenzene, and sodium acetate, as described in U. S. Patent No. 775,367.

Upon treatment with hydrosulphite of sodium and caustic-soda lye it is transformed into its hydroproduct, a violet-blue vat being thus obtained which dyes cotton pure-green fast shades.

ORANGE SULPHUR DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin und Anilinfarben Fabrik. Patent No. 785,675, dated March 21, 1905.

This invention has reference to the manufacture of sulphur dyes, and is based upon the discovery that the azo dyes resulting from the combination of the diazo compounds of easily-volatile aromatic amins with mono-acetyltoluylendiamin ($\text{CH}_3\text{:NH}_2\text{:NH.COCH}_3\text{—1:2:4;}$) are very suitable for the production of valuable orange sulphur dyes.

The process consists in heating to higher temperatures these azo dyes together with sulphur advantageously in the presence of bases

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of the diphenyl series and subsequently treating with caustic alkalies or alkali sulphides in order to render the products more easily soluble. The coloring-matters thus obtained yield bright clear orange shades on cotton when dyed in a sodium sulphide bath, remaining nearly unaltered by subsequently treating them with chromium agents and being distinguished by great fastness to washing.

VIOLET ANTHRACENE DYE AND PROCESS OF MAKING SAME.

Oscar Bally, of Mannheim, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 786,085, dated March 28, 1905.

This invention relates to the production of new products which are of use for the preparation of new coloring-matters.

It is well known that beta-amido-alizarin can be condensed with glycerin in the presence of sulphuric acid, yielding the chinolin of alizarin. The inventor has now discovered that beta-amido-anthrachinon when treated in the same manner does not yield the corresponding anthrachinolinchinon but the condensation proceeds further, so that one molecular proportion of the beta-amido-anthrachinon condenses with two molecular proportions of glycerin, yielding new compounds. Instead of beta-amido-anthrachinon itself other amido-anthrachinons which contain an amido group in the beta position and also sulpho-acids of the beta-amido-anthrachinons may be employed, and the term "beta-amido-anthrachinon" body includes both the beta-amido-anthrachinons and their sulfo-acids. The condensation may further take place with or without the addition of nitrobenzene or other body which exerts a similar influence on the reaction. The product of condensation of beta-amido-anthrachinon and glycerin is not homogeneous, but consists of two or more very similar compounds. All of these condensation products, both from the beta-amidonaphthol-disulpho-acid R. The trichlor-anilin which is used in naphthol-disulpho-acid.

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All of these condensation products, both from the beta-amido-anthrachinons and also from the sulfo-acids of the same, on being melted with caustic alkali give violet coloring-matters which possess properties similar to those of indanthrene.

BLUE-RED AZO DYE.

Paul Julius and Ernest Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 786,767, dated April 4, 1905.

The inventors have discovered that a new and valuable azo coloring-matter which in the form of its lakes is characterized by its fastness against the action of light and possesses beautiful bluish-red shades can be obtained from 3.4.6-trichlor-anilin and beta-naphthol-disulfo-acid R. The trichlor-anilin which is used in this invention can be obtained according to the process described by Lesimple.

The new azo coloring-matter is soluble in water and forms a bluish-red barium-aluminium lake. Upon reduction with tin and hydrochloric acid it yields 3.4.6-trichlor-anilin and amido-naphthol-disulfo-acid.

CLARET-RED MORDANT DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin und Anilinfarbenfabrik. Patent No. 787,046, dated April 11, 1905.

This invention relates to the manufacture of valuable mordant coloring-matters dyeing on wool from an acid-bath yellow shades, which on subsequently treating with chromium compounds acting as oxidizing agents are changed into a claret red distinguished by an excellent fastness. These coloring-matters result from the combination of 6.2-nitro-diazophenol-4-sulphonic acid with cresotinic acids, such as ortho- and meta-cresotinic acid.

The dyestuff obtained from meta-cresotinic acid forms in its dry state a yellowish-red powder, dissolving in concentrated sulphuric acid with a reddish-yellow and in water with a reddish-

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orange color. The aqueous solution becomes a little altered by hydrochloric acid, but on addition of sodium lye it changes to red. The dyestuff yields on wool from an acid-bath a reddish yellow, which on after treatment with a chromium compound turns to a yellow-claret red.

The corresponding dyestuff from o-cresotinic acid forms a yellowish powder and yields on subsequently treating with a chromium mordant shades of some bluer tinge. These dyeings are distinguished by an excellent fastness to light, milling and steaming.

ORANGE-RED AZO DYE.

Paul Julius and Ernst Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors, to Badische Anilin und Soda Fabrik. Patent No. 787,767, dated April 18, 1905.

The inventors have discovered that new and valuable azo coloring-matters which in the form of their lakes are characterized by excellent fastness against the action of light can be obtained by combining beta-naphthol with diazotized 3.4-dichlor-anilin-5—carrying out our invention can be obtained by various methods—for instance, either by sulphonating 3.4-dichlor-anilin or by sulphonating 3.4-dichlor-nitro-benzene and then reducing the dichlor-nitro-benzene-sulpho-acid obtained or by nitrating 3.4-dichlor-benzene-sulpho-acid and then reducing the nitro compound obtained.

The new coloring-matters form orange pastes and are soluble in water. They are especially applicable to the production of lakes, their barium-aluminium lakes being orange-red. When dyed on animal fiber, they produce yellow-orange shades. Upon reduction with tin and hydrochloric acid they yield 3.4-dichlor-anilin-sulpho-acid and amido-naphthol.

BLUE-RED AZO DYE.

Paul Julius and Ernst Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 787,768, dated April 18, 1905.

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The inventors have discovered that a new and valuable azo coloring-matter, which in the form of its lakes is characterized by excellent fastness against the action of light, can be obtained by combining diazotized 3,4-dichlor-anilin with beta-naphthol-disulpho-acid R. The 3,4-dichlor-anilin which is used in carrying out this invention can be obtained by the method given by Beilstein and Kurbatow.

The new coloring-matter consists of a red powder and is soluble in water. It is especially applicable to the production of lakes, its barium-aluminum lake being bluish red. When dyed on animal fiber it produces orange-red shades. Upon reduction with tin and hydrochloric acid it yields 3,4-dichlor-anilin and amido-naphthol-disulpho-acid.

PROCESS OF MAKING BLACK DYES.

René Bohn, of Mannheim, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 787,824, dated April 18, 1905.

This invention relates to the production of coloring-matters from naphthazarin.

In the specification of Patent No. 631,613 is described the production of blue-black coloring-matters by condensing naphthazarin with aromatic amines and afterward sulphonating the condensation products. The inventor has now discovered that coloring-matters can be obtained by directly condensing naphthazarin, while suspended in water and in the presence of boric acid, with the sulphonic acids of aromatic amines. The coloring-matters obtained in this manner yield shades which on treatment with a bichromate become deep blue-black.

The products of the process according to this invention are included among those claimed generically in the above-mentioned Patent No. 631,613.

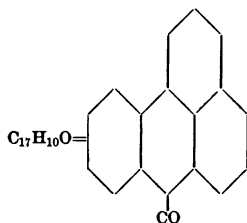
ANTHRACENE COMPOUND AND PROCESS OF MAKING SAME.

Roland Heinrich Scholl, of Karlsruhe, and Oscar Bally, of Mann-

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heim, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 787,859, dated April 18, 1905.

The inventors have discovered that many anthracene compounds which do not contain nitrogen can be condensed with glycerin, yielding compounds which may be regarded as derivatives of a parent substance, is called "benzanthrone" and which possesses a composition corresponding to the following structural formula:



The anthracene compounds which can be used according to this invention include anthracene itself, its meso-oxy and hydroxy derivatives, and also the sulpho-acids of any of these compounds. Of course instead of anthracene its homologues may be employed. The condensation generally takes place on heating together the anthracene body and the glycerin; but in most cases the presence of sulphuric acid or of another body or bodies which may assist in the condensation is advisable. After the condensation the melt is poured into water or ice and water, whereupon the products obtained from the unsulphonated compounds are generally precipitated, whereas those obtained from the sulphonated anthracene compounds are more soluble in water, but can be precipitated by the addition of common salt to the solution. These condensation products on being melted with caustic alkali yield violet-blue coloring-matters possessing general characteristics similar to those of indanthrene—that is to say, they cannot be used directly for dyeing, because they are insoluble in water—but on treatment with an alkaline reducing agent—for instance, alkaline hydro-

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sulphite—they yield soluble leuco compounds which dye vegetable fibre shades which on washing with water become fixed, being reconverted into the insoluble coloring-matter. The condensation products are all characterized by their solubility in concentrated sulfuric acid, in which they yield from orange to green solutions sulphuric acid, in which they yield from orange to green solutions

AZO DYE.

Paul Julius and Ernst Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 789,096, dated May 2, 1905.

This invention relates to the production of an azo coloring-matter which, in the form of its lakes, possesses excellent properties, being very stable against the action of light.

Although the azo coloring-matters prepared from a mono-substituted anilin and beta-naphthol disulpho-acid R in the form of their lakes are, as a rule, worthless, the azo coloring-matter prepared by combining diazotized para-chlor-anilin with beta-naphthol sulpho-acid R possesses, in the form of its lakes, very beautiful shades and great coloring power and is also very stable against the action of light.

The coloring-matter consists of a brown-red powder which is easily soluble in hot water. Its barium salt possesses a deep blue-red color and is almost insoluble in water. Upon reduction with tin and hydrochloric acid it yields para-chlor-anilin and amido-naphthol disulpho-acid.

ALIZARIN DYE.

Robert E. Schmidt and Arnold Fischer, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co., of New York. Patent No. 790,079, dated May 16, 1905.

This invention relates to the manufacture of a new dyestuff of the anthracene series, which can be obtained by treating with formic aldehyde in acid solution the so-called "alizarin-blue,"

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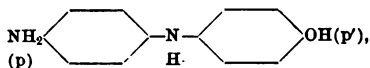
(dioxyanthraquinonequinolin obtainable by the action of glycerin and sulphuric acid on beta-nitroalizarin). The new dyestuff thus obtained is when dried and pulverized a dark powder, soluble in concentrated sulphuric acid with a reddish brown and in caustic-soda lye and ammonia with a green color. It combines with alkaline bisulphites yielding compounds which are soluble in water and which produce from gray to black level shades on being printed on cotton along with chrome mordants, such as acetate of chrome or the like.

BLUE-SULPHUR DYE AND PROCESS OF MAKING SAME.

Julius Abel, of Mannheim, and Arthur Lüttringhaus, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 790,167, dated May 16, 1905.

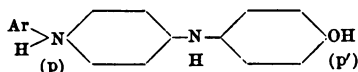
The inventors have discovered that by heating an alkali salt of a para-amido-para'-hydroxydiarylamino body with sulphur new and valuable coloring-matters containing sulphur are obtained which possess the peculiar characteristic that they are difficultly soluble in sodium-sulphide solution in the cold, while in a hot solution they are more readily soluble; but in both cases the solution obtained is almost colorless or possesses only a faint yellow color and no intermediate formation of a blue solution takes place. Vegetable fibre when immersed in a hot solution has an affinity for the colorless leuco compound, and this becomes fixed on the fibre, which remains nearly colorless so long as it is in the solution, but on being exposed to the air becomes blue to violet-blue. In the cold solution the fibre has essentially less affinity for the leuco compound.

The term "para-amido-para'-hydroxydiarylamino body" includes the para-amido-para'-hydroxydiarylamino itself



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its para-arylamido derivative



and the homologues and substitution products of these compounds. The coloring-matter claimed specifically is that obtainable by heating the alkali salt of para-phenylamido-para-hydroxydiphenylamine with sulphur, and this produces pure-blue shades on vegetable fibre.

NITROAZO DYE AND PROCESS OF MAKING SAME.

John Hagenbach, of Basel, Switzerland, assignor to Anilin Color and Extract Works, formerly John R. Geigy. Patent No. 790,363, dated May 23, 1905.

The nitration of diazo bodies without decomposition has never been effectuated with success until now on account of their lack of stability but it is now found that the diazo body, which is obtained from the 1-amido-2-naphthol-4-sulphonic acid by diazotizing the latter in the presence of a neutral copper salt, can be nitrated without decomposition in the well-known manner, yielding a good crystallizing durable nitrodiazo compound, which when coupled with beta-naphthol gives a novel and very valuable nitro ortho oxy azo coloring-matter, dyeing wool from acid-bath dark reddish brown, which shade after subsequent treatment in the same bath with bichromate turns soot-black, distinguished for an extremely great fastness to the action of light and the processes of milling and potting. The facility with which the said diazo compound can be nitrated is probably based upon the character of the non-nitrated diazo body, which against all expectation and against all analogies is scarcely decomposable in its isolated and dry state. It can be dried without danger of explosion at a temperature of from 80°

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to 100° C., and also in dry state it is not explosive. The effect of the nitro group in the combination of this nitro diazo compound with beta-naphthol is a very surprising one in two directions, first, the nitro group multiplies the tinctorial character of the thus-obtained coloring-matter and deepens the shade; secondly, it increases the ability of combination of the diazo compound in a considerable degree.

AZO DYE AND PROCESS OF MAKING SAME.

John Hagenbach, of Basel, Switzerland, assignor to Aniline Color and Extract Works, formerly John H. Geigy. Patent No. 790,364, dated May 23, 1905.

The invention relates to the manufacture of new azo dyes of the naphthalene series, very soluble in water, by sulphonation of the oxyazo dyes obtained by combination of diazo-naphthalsulphoacids with naphthol. These dyestuffs yield on wool dyed in the usual manner and subsequently treated with chromic compounds blue-black shades of very valuable properties.

The coloring-matter obtained by coupling the 1-diazo-2-naphthol-4-sulphonic acid or its anhydrid with beta-naphthol dyes wool when after-treated with chrome in blue-black shades of remarkable fastness; but on account of its insufficient solubility in acetic-acid solution its application for dyeing in apparatus causes some difficulties. To bring this coloring-matter into a more soluble form when avoiding too high temperatures, which cause the decomposition of the coloring-matter, the sulphonation can be accomplished very easily by aid of concentrated sulphuric acid, especially when mixed with a certain proportion of anhydrous sulphuric acid. The thus-obtained new coloring-matter is extremely soluble in water, but shows, nevertheless, the same excellent solidity against milling and potting as the original coloring-matter. Besides the advantage of the remarkable solubility the new coloring-matter possesses all the same good qualities of the starting stuff.

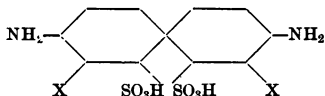
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YELLOW DYE.

Hugo Witter, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 791,524, dated June 6, 1905.

This invention relates to the production of new tetrazo dyestuffs which dye wool yellow shades fast to milling and do not stain the interwoven white cotton or wool.

The new dyestuffs can be obtained by combining with two molecular proportions of phenylmethylpyrazolon one molecular proportion of the tetrazotized derivatives of benzidin- or tolidin-meta-disulphonic acid having the following general formula:



in which formula X means hydrogen atoms which can be replaced by the methylic group.

The new coloring-matters are in the shape of their alkaline salts yellowish-red powders soluble in water and in concentrated sulphuric acid with a yellow color and yielding upon reduction with stannous chlorid and hydrochloric acid the diamidodiazolyl-disulphonic acids of the above-given general formula and amido-methylphuric acids of the above-given general formula and amido-methylfast to milling.

YELLOW DYE.

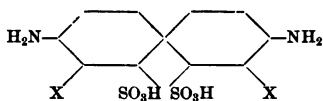
Hugo Witter, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 791,525, dated June 6, 1905.

This invention relates to the production of new tetrazo dyestuffs which dye wool yellow shades fast to milling and do not stain the interwoven white cotton or wool.

The new dyestuffs can be obtained by combining with one molecular proportion of phenylmethylpyrazolon and one molecular proportion of alpha-methylindol (methylketol) the tetrazotized

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derivatives of benzidin- or tolidin-meta-disulphonic acid, having the following general formula:



in which formula X means hydrogen atoms which can be replaced by the methylic group.

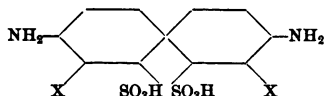
The new coloring-matters are, in the shape of their alkaline salts, brownish powders soluble in water and in concentrated sulphuric acid with a yellow color and yielding upon reduction with stannous chlorid and hydrochloric acid the diamido-diaryldisulphuric acids of the above-given general formula and amido-methylphenylpyrazolon and amido-alpha-methylindol. They dye wool from acid-baths yellow shades fast to milling.

YELLOW TETRAZO DYE.

Hugo Witter, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 791,526, dated June 6, 1905.

This invention relates to the production of new tetrazo dyestuffs which dye wool from acid-baths yellow shades fast to milling and do not stain the interwoven white cotton or wool.

The new dyestuffs can be obtained by combining with two molecular proportions of alpha-methylindole (methyl-ketole) one molecular proportion of the tetrazotized derivatives of benzidin or tolidin-meta-disulphonic acid having the following general formula:



in which formula X means hydrogen atoms, which can be replaced by the methylic group.

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The new coloring-matters are after being dried and pulverized in the shape of their alkaline salts brownish-yellow powders soluble in water and in concentrated sulphuric acid with a yellow color and yielding upon reduction with stannous chlorid and hydrochloric acid the diamidodiarlyldisulphonic acids having the above-given general formula and amidomethylketol. They dye wool from acid-baths yellow shades fast to milling.

BROWN ANTHRACENE DYE.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin und Soda Fabrik, of Ludwigshafen-on-the-Rhine, Germany. Patent No. 791,869, dated June 6, 1905.

In the specification of Patent No. 767,259 there is described the production of gray coloring-matters which possess properties similar to those of indanthrene and flavanthrene. These coloring-matters can be obtained by melting diamidoanthrachinons or their sulpho-acids with caustic alkali, and they can only be used for dyeing and printing when a special process is employed.

It is now discovered that coloring-matters which belong to the same generic class and which, with the exception of their shades, possess properties similar to those of the afore-mentioned coloring-matters can be obtained by melting with caustic alkali the formaldehyde derivatives of diamidoanthrachinons. The compounds at present employed are the formaldehyde derivatives of 1.5 and of 1.8 diamidoanthrachinon. Whereas the coloring-matters produced according to the specification of Patent No. 767,259 yield from reddish-gray to greenish-gray shades on cotton, the new coloring-matters produce brown shades.

The coloring-matters in the form of pastes possess a reddish-brown color, but when dry form black powders which are practically insoluble in the usual solvents. They are, however, soluble in concentrated sulphuric acid, yielding yellowish-brown solutions. With reducing agents, such as sodium hydrosulphite, in the presence of caustic alkali, they give brown to red vats which dye vege-

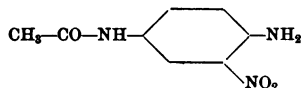
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table fibre substantively, yielding reddish-brown shades, which when exposed to the air, turn brown.

BLUE-BLACK AZO DYE.

Martin Herzberg, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 792,032, dated June 13, 1905.

The inventor has found that new and valuable azo dyestuffs are obtained by first combining the diazo compounds obtainable from mononitroacetyl-para-phenylenediamin having the formula:



with dioxynaphthalene disulphonic acids and then splitting off from the resulting dyestuffs the acetyl group by saponification.

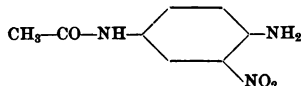
The new dyestuffs are in the shape of their alkaline salts dark powders soluble in water. They yield upon suitable treatment with stannous chlorid and hydrochloric acid triamidobenzene and amidodioxynaphthalene disulphonic acids and dye unmordanted wool from acid-baths black shades.

The claim specifies the product so obtained from 1.8 dioxynaphthalene 3.6 disulphonic acid.

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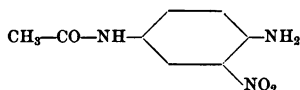
The new dyestuffs are in the shape of their alkaline salts dark powders soluble in water. They yield upon suitable reduction with stannous chlorid and hydrochloric acid triamidobenzene and diamidonaphthol disulphonic acids. They dye unmordanted wool from acid-baths black shades.

The claim specifies the product so obtained from 1.8 amido naphthol 3.6 disulphonic acid.

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with amidonaphthol disulphonic acids in alkaline solution and then splitting off from the resulting dyestuffs the acetyl group by saponification.

The new dyestuffs are, in the shape of their alkaline salts, dark powders soluble in water. They yield upon suitable reduction with stannous chlorid and hydrochloric acid triamidobenzene and diamidonaphthol disulphonic acids. They dye unmordanted wool from acid-baths black shades.

The claim specifies the product so obtained from 1.8 amido naphthol 3.6 disulphonic acid.

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AZO DYE ADAPTED TO FORM LAKES.

Paul Julius and Ernst Fussenegger, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 792,421, dated June 13, 1905.

This invention relates to the manufacture of new azo coloring-matters which are especially suitable for use in the form of their lakes.

The new coloring-matters are prepared by combining with 2-naphthol-3,6-disulpho-acid a diazotized meta-nitro-amido-benzene which contains a methyl group in the para position to the amido group. The bases which we may make use of include nitro-toluidin ($\text{NH}_2:\text{NO}_2:\text{CH}_3=1:3:4$) and nitro-xylidin, ($\text{NH}_2:\text{NO}_2:\text{CH}_3:-\text{CH}_3=1:3:4:6$).

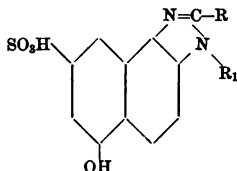
The product obtained from nitro-xylidine is easily soluble in hot water.

Its barium salt is insoluble and possesses a bluish-tinted red color. Upon reduction with tin and hydrochloric acid it yields 4,6-diamido-meta-xylene and amido-naphthol-disulpho-acid.

REDDISH AZO DYE.

Karl Krekeler, of Elberfeld, and August Blank, of Leverkusen, near Cologne, Germany, assignors to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 792,600, dated June 20, 1905.

This invention relates to the production of new azo dyestuffs which can be obtained by combining diazo compounds with the 1,2-naphthimidazol-5-oxy-7-sulphonic acid or derivatives thereof substituted in the heterocyclic nucleus having the following general formula:



R and R_1 , meaning hydrogen or an aryl or alkyl. The said naph-

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timidazols can be obtained by the action of aldehydes, acid anhydrides, or acid chlorids on the 1.2-diamido-5-naphthol-7-sulphonic acid. On employing acid anhydrides or acid chlorids the acidyl derivatives at first produced must be heated with acids in order to form the heterocyclic nucleus.

The new dyestuffs are in the shape of their alkaline salts from red to dark powders soluble in water with from a red to reddish-blue color, soluble in concentrated sulphuric acid with from a bluish-red to blue color, and dyeing unmordanted cotton from red to reddish-blue shades.

ANTHRACENE DYE AND PROCESS OF MAKING SAME.

Oscar Bally, of Mannheim, and Hugo Wolff, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 793,558, dated June 27, 1905.

This invention relates to the manufacture of new coloring-matters of the anthracene series.

If hydroxyanthraquinones—such as monohydroxyanthraquinone, alizarin, quinizarin, and also polyhydroxyanthraquinones and the derivatives of these bodies, in particular their hydro derivatives, such as beta-hydroxyanthranol and leuco quinizarin—be condensed with glycerin, new coloring-matters are obtained which dye mordanted material, yielding different shades from those obtained from the initial materials. The condensation can best be effected in sulphuric acid solution and proceeds most readily when the hydro derivatives of the hydroxyanthraquinones are used. The same condensation products are obtained in the latter case as when using the hydroxyanthraquinones themselves. When these latter are used, it is advantageous to add a reducing agent—such as ferrous sulphate, anilin sulphite, zinc, or tin—to the melt.

ORANGE-RED ACRIDIN DYE.

Otto Sohst, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius and Brünig. Patent No. 794,052, dated July 4, 1905.

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This inventor has found that the orange-yellow acridinium dyestuffs or their leuco compounds derived from acridin-yellow and obtained, for instance, by the action of hydrochloric acid and alcohol on leuco acridin-yellow may be transformed into orange-red dyestuffs if heated in an open vessel with formaldehyde in concentrated sulphuric acid.

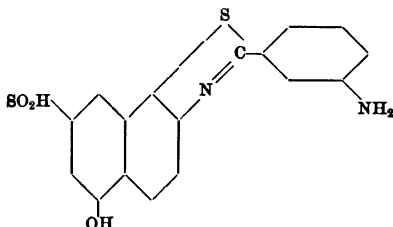
When dry, the dyestuff is a brown-red powder easily soluble in water with an orange-yellow color, dyeing cotton treated with tannin and leather orange-red shades. With concentrated sulphuric acid a yellow solution of a decided green fluorescence is obtained, which on adding little water turns orange and on adding much water becomes red. In alcohol the dyestuff is difficultly soluble with an orange-red color insoluble in ether, benzene, and ligroin.

The dyestuff is not uniform, but consists for the greater part of an acridinium and for the rest of an acridin dyestuff, which owing to their different behavior toward ammonia may be easily separated.

NEW AZO DYE.

Alfred Thauss, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 794,568, dated July 11, 1905.

The inventor has found that new and valuable azo dyestuffs can be obtained by first combining diazo compounds with the thiazol-sulphonic acid having the following formula:



which may be termed "meta-amidobenzenylthio-2-5-amidonaph-

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thol-7-sulphonic acid," and then isolating from the reaction mass the resulting dyestuffs.

The above-mentioned thiazol-sulphonic acid can be produced by heating with alkaline polysulphides the meta-nitro-benzylidene-2-5-amidonaphthol-7-sulphonic acid—that is to say, the condensation product of meta-nitrobenzaldehyde with 2-5-amidonaphthol-7-sulphonic acid.

The new dyestuffs produced in the above-defined manner are in the shape of their alkaline salts from brownish red to brown powders soluble in water with a red color and being dissolved by concentrated sulfuric acid with from a red to violet color. They dye unmordanted cotton from yellowish-red to bluish-red shades. When on fibre, these dyestuffs can be further diazotized and coupled with beta-naphthol, yellower and more deepened shades fast to washing being thus obtained.

BISULPHITE COMPOUND OF A TETRAZO DYE AND PROCESS OF MAKING SAME.

Alexander Otto, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius und Brüning. Patent No. 795,058, dated July 18, 1905.

The inventor has found that by the action of bisulphites the disazo dyestuff soluble with difficulty obtained from one molecular proportion of ortho-ortho-tetrazophenol-para-sulphonic acid and two molecular proportions of beta-naphthol may be transformed into a readily-soluble bisulphite compound very stable, as monosodium salt, which does not become decomposed when dried at a high temperature.

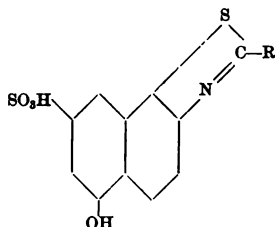
The process is based on the fact that a quantity of a mineral acid equivalent to the bisulphite compound used is added to the solution previous to being evaporated, so that the reaction is just acid. The solution becomes then of a light yellow-red and may be evaporated to dryness without decomposing.

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THIAZOL SULPHONIC ACID.

Alfred Thauss, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 795,869, dated August 1, 1905.

The inventor has found that the hitherto unknown thiazol-sulphonic acid having the following general formula:



(R meaning an aryl, such as phenyl, tolyl, xylyl, amidophenyl, or the like,) can be produced by heating with alkaline polysulphides the condensation products (benzylidene compounds) obtainable from aromatic aldehydes—such as benzaldehyde, meta-nitrobenzaldehyde, or the like—and 2-5-amidonaphthol-7-sulfonic acid.

The new thiazol sulphonic acids produced in the above-defined manner are, in the shape of their alkaline salts, from whitish to grayish powders soluble in water. They combine with diazobenzene, forming thus red dyestuffs directly dyeing cotton.

The claim specifically covers meta-amidobenzenylthio-2-5-amidonaphthol-7-sulphonic acid.

RED-VIOLET SULPHUR DYE AND PROCESS OF MAKING SAME.

Theodor Muchall, of Biebrich, Germany, assignor to the firm of Kalle & Company. Patent No. 796,443, dated August 8, 1905.

This invention relates to a new sulphur color dyeing a red violet on cotton. It is found that a poly-oxyrosindulin is formed if an aqueous suspension of benzene-azo-alphanaphthylamin is boiled

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with para-amidophenol at a reflux cooler. This rosindulin derivative has only very little affinity for the cotton fibre; but it yields when melted with an alkali polysulphide at 160° C. a sulphur color which dyes cotton in a sodium sulphide bath a red-violet shade of considerable fastness.

PROCESS OF MAKING A YELLOW SULPHUR DYE.

Julius Hoerlin, of Uerdingen-on-the-Rhine, Germany, assignor to Chemische Fabriken vormals Weiler-Ter-Meer. Patent No. 796,514, dated August 8, 1905.

The inventor has found that by heating sulphur to a high temperature with a mixture of benzidin and nitroethenyle-o-phenylen-diamin (nitro-a-methylebenzimidazole) or the amido compound a sulphur dye is obtained which imparts to cotton a pure greenish-yellow color of great durability and strength, the tint being somewhat more green than that obtained by means of dye produced from sulphur and the amido compound alone. As compared with the latter dye the dye produced according to this process has the advantage that in its manufacture at least one-half of the expensive benzimidazole can be replaced by benzidin, and the nitrobenzimidazole, which can be used in place of the amidobenzimidazole, is more easy to manipulate in a solid state.

AZO DYE AND PROCESS OF MAKING SAME.

Thilo Kroeber and Carl Jagerspacher, of Basel, Switzerland, assignors to the firm of Society of Chemical Industry in Basle. Patent No. 797,441, dated August 15, 1905.

The inventors claim that by introducing an acid radicle into the molecule of the amidonaphtholsulphonic acid, the latter may be diazotized contrary to the usual view. If, for example, the basic sodium salt of 1:2:4-amidonaphtholsulphonic acid is treated with the calculated proportion or with a slight excess of acetic anhydrid at a reduced or at ordinary temperature, acetylation occurs, the acetyl group apparently attacking nearly exclusively the

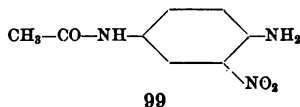
Patents for the Year 1905

hydroxyl group. If, for instance, the liquid containing the product of the reaction (in case an excess of anhydrid has been used a corresponding excess of alkali is added, so that at the end of the acetylation all may be completely dissolved and the reaction to red litmus may be even feebly alkaline) is mixed with mineral acid and nitrite while cooling with ice until even after lengthy waiting iodine paper still shows a reaction, there is obtained a diazo compound which separates as yellow crystals and may be easily coupled with azo dyestuff components. From its behavior it appears to be ortho-acetoxydiazonaphthionic acid. It combines, for example, with beta-naphthol to form a red dyestuff which gradually or more quickly when warmed passes to a greenish-blue dyestuff in consequence of the elimination of the acetyl group. This elimination occurs also when the said diazo compound is allowed to remain long at rest. Already after the lapse of an hour it is found that a sample treated with an alkaline solution of beta-naphthol does not combine immediately and with a red color, but more gradually with a yellowish-green and later a blue color, a behavior which must be ascribed to the diazonaphtholsulphonic acid which indeed is characterized by great stability toward heat, however, differs by the more gradual coupling tendency from the corresponding acetyl derivative. The diazonaphtholsulphonic acid is somewhat sparingly soluble in water containing mineral salts, but more easily soluble in pure water.

BLACK AZO DYE.

Martin Herzberg, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 797,731, dated August 22, 1905.

The inventor has found that new and valuable azo dyestuffs are obtained by first combining the diazo compounds obtainable from mononitroacetyl-paraphenylenediamin having the formula



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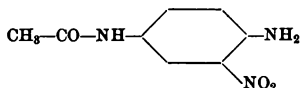
with alkyloxynaphthol disulphonic acid and then splitting off from the resulting dyestuffs the acetyl group by saponification.

The new dyestuffs are in the shape of their alkaline salts dark powders soluble in water. They yield upon suitable treatment with stannous chlorid and hydrochloric acid triamidobenzene and amidoalkyloxynaphthol disulphonic acids and dye unmordanted wool from acid-baths black shades.

BLACK AZO DYE.

Martin Herzberg, of Elberfeld, Germany, assignor to Farben-fabriken of Elberfeld Co., of New York, N. Y. Patent No. 797,732, dated August 22, 1905.

It is found that new and valuable azo dyestuffs are obtained by first combining the diazo compounds obtainable from mono-nitroacetyl-paraphenylenediamin having the formula



with alkylamidonaphthol disulphonic acids, and then splitting off from the resulting dyestuffs the acetyl group by saponification. By the term "alkylamidonaphthol disulphonic acids" are meant amidonaphthol disulphonic acids which are substituted in the amido group by alkyls or aryls, such as methyl, phenyl, benzyl, dinitrophenyl, the glycine group, or the like.

The new dyestuffs are in the shape of their alkaline salts dark powders soluble in water. They yield upon suitable reduction with stannous chlorid and hydrochloric acid triamidobenzene and amidoalkylamidonaphthol disulphonic acids. They dye unmordanted wool from acid-baths black shades.

YELLOWISH AZO DYE.

Fritz Carl Günther, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 798,098, dated August 29, 1905.

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The inventor has discovered that by combining 2,6-diamido-1-chlor-benzene-4-sulpho-acid with diazo compounds of the benzene and naphthalene groups new and valuable coloring-matters can be obtained which dye wool from an acid-bath, yielding from pure yellow to reddish-yellow shades which have a bright appearance "overhand" and are also very fast against the action of acids, the said coloring-matters possessing excellent equalizing power. The diazo compounds found to yield especially valuable coloring-matters when combined with 2,6-diamido-1-chlor-benzene-4-sulpho-acid include the diazo compounds of sulphanilic acid, metanilic acid, meta-nitranilin, naphthionic acid, anilin, and 2,1-naphthylamin sulpho-acid.

The coloring-matters which claimed generically are those which can be obtained by combining a diazo compound of the benzene or naphthalene groups with 2,6-diamido-1-chlor-benzene-sulpho-acid, and they possess the following properties: They dissolve in water, and the solutions, to which a little sodium carbonate has been added, are from reddish yellow to greenish yellow. When dyed on wool, they produce from reddish-yellow to greenish-yellow shades. Upon reduction with tin and hydrochloric acid they yield 2,3,6-triamido-1-chlor-benzene-4-sulpho-acid.

The coloring-matter which claimed specifically is that which can be obtained by combining diazotized sulfanilic acid with 2,6-diamido-1-chlor-benzene-4-sulpho-acid.

ANTHRACENE COMPOUND AND PROCESS OF MAKING SAME.

Max Henry Isler, of Mannheim, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 798,104, dated August 29, 1905.

In the specification of U. S. Patent No. 787,859, is described the production of new products of the anthracene series by condensing certain anthracene compounds with glycerin. These anthracene compounds include anthracene itself, also anthraquinone, anthranol, oxanthranol, and the sulpho-acids of these compounds, and in

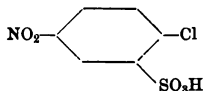
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all cases the new condensation products contain a benzanthrone grouping. It is now discovered that similar new compounds which fall generically under the claims of the above-mentioned specification, but which are specifically different, can be obtained by condensing a naphthanthraquinone body with glycerin. The bodies of use in this invention include naphthanthraquinone itself, also its homologues and the hydro derivatives of all these compounds. The condensation proceeds in a manner very similar to that described, and bodies containing the benzanthrone group, although, of course, with another benzene ring attached, are obtained. These can conveniently be termed specifically "benznaphthanthrones" and they possess the following properties: They are insoluble in water, but are soluble in concentrated sulphuric acid. On being melted with caustic alkali they yield dyestuffs which, similarly to those obtained from the products claimed in the above-mentioned specification, can be dyed from alkaline-hydrosulphite vat. They produce shades, however, which are more greenish blue.

DIAMIDODIPHENYLAMIN SULPHONIC ACID AND PROCESS OF MAKING SAME.

Hugo Geldermann, of Berlin, Germany, assignor to Actien-gesellschaft für Anilin Fabrikation. Patent No. 800,735, dated October 3, 1905.

The inventor has found that new diamidodiphenylamin sulphonic acids, which are of very great value for dyeing purposes, can be produced by reducing the corresponding nitroamidodiphenylamin sulphonic acid obtained by the action of para-chlornitrobenzene sulphonic acid:



on a meta-diamin of the benzene series, such as meta-phenylenediamin or metatoluylenediamin. These bodies are an excellent means

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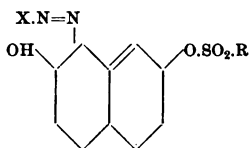
for dyeing leather in so far as they permit of a thorough penetration of the leather if black tints are to be produced therewith. In doing so these substances are to be used in combination with an oxidizing agent.

YELLOW-RED AZO DYE.

Wilhelm Herzberg, of Berlin, Germany, assignor to Actien Gesellschaft für Anilin Fabrikation. Patent No. 800,914, dated October 3, 1905.

This invention relates to the production of a new group of mono-azo coloring-matters which in the form of their lakes are distinguished by their brilliant blue-red or yellow-red shade and by a great fastness against the action of light, which lakes are insoluble in water and oil.

These new azo dyes are derived from an ortho-amido-sulphonic acid of the benzene or naphthalene series the diazo compounds of which is combined in the usual manner with 2.7-diovinaphthalene, the azo dyes thus obtained is treated, for instance, with benzene-which is combined in the usual manner with 2.7-dioxynaphthalene, sulpho chlorid $C_6H_5 \cdot SO_2 \cdot Cl$ or para-toluene-sulpho chlorid $CH_3C_6H_4 \cdot SO_2 \cdot Cl$ in the presence of an alkaline agent. Thus the general



X meaning the radical of an ortho-amido sulphonic acid of the benzene or naphthalene series—as, for instance, para-nitranilin-ortho-sulphonic acid, meta-chloro-anilin-ortho-sulphonic acid, para-toluidin-ortho-sulphonic acid, para-phenetidin-ortho-sulphonic acid, 2.1-naphthylamin-ortho-sulphonic acid, etc., and R meaning the radical C_6H_5 or $C_6H_4 \cdot CH_3$ or another suitable sulphonic acid, the chlorid of which is to act on the one OH group of the 2.7-dioxynaphthalene, yielding the corresponding ester.

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ANTHRAQUINONE DYE.

Paul Thomaschewski, of Elberfeld, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York, N. Y. Patent No. 801,418, dated October 10, 1905.

This invention relates to the manufacture of a new dyestuff, being a hydroazin derivative of the anthracene series.

The process for producing this coloring-matter consists in heating the 1-oxy-3-bromo-4-amidoanthraquinone (obtainable by the action of bromin on para-amido-oxyanthraquinone) with cupric chlorid in the presence of a suitable dissolving or diluting agent and preferably with the addition of a product having a weak alkaline reaction, such as sodium acetate or the like.

The new coloring-matter thus obtained crystallizes from quinolin in the shape of blue needles having a cupreous lustre. It is soluble in hot quinolin with a bluish-green color and soluble in concentrated sulphuric acid with an olive-green color. Upon treatment with hydrosulphite and caustic-soda lye it is transformed into its hydro compound, the blue alkaline solution of which has the properties of a "vat" suitable for dyeing and printing unmordanted cotton pure greenish-blue fast shades.

BROWN SULPHUR DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin- und Anilinfarbenfabrik. Patent No. 801,598, dated October 10, 1905.

This invention relates to the manufacture of new brown sulfur dyes, which are distinguished by excellent properties of fastness. These dyestuffs are produced by subjecting to the melting process with alkali polysulphides the reaction products of formaldehyde and resorcin—as, for instance, methylene diresorcin or its condensation products—insoluble in alkalis, (cf. Caro, *Ber. D. D. Chem. Ges.*, XXV., 947, and Möhlau, *ibid.*, XXVII., 2888,) together with the metadiamins of the benzol series. The new dyestuffs represent

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uniform products. They cannot be formed by mixing the dye-stuffs, which might result by melting the single components.

GREEN-BLUE SULPHUR DYE AND PROCESS OF MAKING SAME.

Ivan Levinstein and Ernest Eugene Naef, of Manchester, England. Patent No. 802,409, dated October 17, 1905.

The inventors have found that para-nitrosophenol and para-nitroso-ortho-cresol or any of the two said compounds which contain a chlorin atom in the ortho position to the hydroxyl group condense under suitable conditions with amidosulpho acids of the benzene and naphthalene series, which have the para position to the amido group unoccupied forming blue-colored compounds. These substances or their reduction products yield, when heated with sodium polysulphides, most valuable new dyestuffs which dye unmordanted cotton greenish-blue shades fast to acid and light.

INDOPHENOL SULPHONIC ACIDS AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin- und Anilinfarbenfabrik. Patent No. 798,807, dated September 5, 1905.

This invention relates to the production of new indophenol sulphonic acids, which are distinguished from other indophenol bodies by their fair stability. These new indophenol sulphonic acids can be obtained by simultaneously oxidizing in an alkaline solution paraphenyldiamin sulphonic acid and a phenol. They represent very important initial materials in the manufacture of sulphur dyes.

BLUE AZO WOOL DYE AND PROCESS OF MAKING SAME.

August Leopold Laska, of Offenbach-on-the-Main, Germany, assignor to the firm of K. Oehler, Anilin und Anilinfarbenfabrik. Patent No. 798,808, dated September 5, 1905.

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This invention relates to the production of a new dyestuff by combining the diazotized 6-nitro-2-amidophenol-4-sulphonic acid with betaoxynaphthoic acid of the fusing-point of 216° centigrade.

The new dyestuff yields on wool, even when dyed in a proportion of only two per cent., an indigo blue which is of a particular value because of its greenish shade.

AZO-DYE LAKE AND PROCESS OF MAKING SAME.

Carl Immerheiser, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 799,058, dated September 12, 1905.

The inventor has discovered that coloring-matter lakes can be prepared from such insoluble azo coloring-matters as shortly after their preparation have a soft, oily, or a resinous consistence or which at a temperature of about 100° centigrade are soft or liquid—that is to say, the coloring-matters must be readily fusible without decomposition.

As examples of azo coloring-matters which are suitable for the purposes of this invention are those prepared from crude xyloidin and beta-naphthol (which at ordinary temperature when freshly turn xyloidin—that is, the product resulting when crude xyloidin has been freed as far as conveniently possible from meta xyloidin and para xyloidin, as is done in the manufacture of these bodies, and beta-naphthol, also crude or return, xyloidin azo-cresol or azo-phenol, or ortho-toluidin azo-phenol or azo-para-cresol, and the like.

To prepare the new lakes, a coloring-matter of the character aforesaid—such, for instance, as that prepared from crude xyloidin and eta-naphthol (which at ordinary temperature when freshly prepared is a pasty, oily or resinous mass) is warmed and intimately mixed with dry and finely ground heavy spar, kaolin, aluminina, or any other substratum usually employed, or capable of use for the preparation of lakes, or the substratum can be made into a paste and be intimately stirred with the melted coloring-matter. The paste so obtained can be directly employed, or it can

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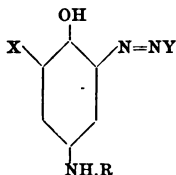
be dried at ordinary or a higher temperature. The ultimate shade is not fully developed until the lake is dry.

MONOAZO DYE AND PROCESS OF MAKING SAME.

Wilhelm Herzberg and Otto Siebert, of Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 803,592 dated November 7, 1905.

It is well known that mordant dyeing mono-azo dyestuffs are obtained by combining the diazo compound of ortho-amidophenol with phenols, amidophenols, amins, diamins, or the sulphonic or carboxylic acids thereof. Mordant dyeing coloring-matters of the same kind are also described in literature which contain in the benzol nucleus of the ortho-amido-phenol certain substitutes—as, for instance, chlorin, methylnitro, or sulpho group.

This invention relates to the manufacture of new azo dyestuffs of the following formula:



in which X represents hydrogen, chlorin, the sulphonic or carboxylic group, Y a naphthol compound, and R stands for hydrogen or an alkyl group, such as the methyl, ethyl group, &c.

By "naphthol compounds" are understood besides naphthol itself, such derivatives thereof as contain a second hydroxyl group or a sulphonic group.

These dye wool from an acid-bath brown-red shades which are

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changed to a deep black by a subsequent treatment with chromium compounds, acting as oxidizing agents.

CYANIN DYE AND PROCESS OF MAKING SAME.

Ernst König, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister, Lucius & Brüning. Patent No. 805,143, dated November 21, 1905.

The object of the present invention is to produce quinaldincyanins which will render the photographic plate more sensitive to red than do those known. For this purpose a mixture of an alkyl halide of quinolin or of quinolin substituted in the meta or para position (which, according to another nomenclature, is the 5 or 6 position) by alkyl or alkyl oxyl and an alkyl halide of quinaldin similarly substituted or a mixture of an alkyl halide of quinaldin substituted in the meta or para position by alkyl or alkyloxyl and an alkyl halide of quinaldin is heated with alkali in a suitable solvent, such as alcohol.

The following dyestuffs have been made according to this invention: quinaldin - meta - toluquinolinalkyleyanin, quinaldin - para-toluquinolinalkyleyanin, quinaldin-para-methoxy-quinolinalkyleyanin, meta-toluquinaldinquinolinalkyleyanin, meta-toluquinaldin-meta-toluquinolinalkyleyanin, meta-toluquinaldin-para-toluquinolinalkyleyanin, para-toluquinaldin-quinolinalkyleyanin, para-toluquinaldin-meta-toluquinolinalkyleyanin, para-toluquinaldin-para-toluquinolinalkyleyanin, para-toluquinaldin-paramethoxy-quinolinalkyleyanin, para-methoxyquinaldin-para-methoxyquinolincyanin, para-ethoxyquinaldin-para-ethoxyquinolincyanin. Of these new dyestuffs are especially distinguished para-toluquinaldin-quinolinalkyleyanin, para - toluquinaldin-para-toluquinolinalkyleyanin, para-toluquinaldin-para-methoxy-quinolinalkyleyanin, para - methoxyquinaldin-para-methoxyquinolincyanin, and para-ethoxyquinaldin-para-ethoxyquinolincyanin by their rendering the photographic plate about twice to four times as sensitive to red as the hitherto known quinaldinquinolincyanin.

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MONOAZO DYE AND PROCESS OF MAKING SAME.

Thilo Kröber, of Basel, Switzerland, assignor to the firm of Society of Chemical Industry in Basle. Patent No. 805,918, dated November 28, 1905.

The invention relates to the manufacture of new monoazo dyestuffs derived from 1-amido-2-acetyloxynaphthalenesulphonic acids and sulphonic acids of 1-8-dioxynaphthalene, according to the process, which consists in acetylizing 1-2-amidonaphtholsulfonic acids in the hydroxyl group, then diazotizing the so-obtained 1-amido-2-acetyloxynaphthalenesulphonic acids and combining the resulting diazo compounds with sulphonic acids of 1-8-dioxynaphthalene.

These new monoazo dyestuffs dissolve in water with violet-blue to blue coloration, in concentrated sulfuric acid with greenish-to blue coloration, in concentrated sulphonic acid with greenish-which become bluish green on treatment with chromium compounds—as, for instance, potassium bichromate.

NAPHTHALENE DYE AND PROCESS OF MAKING SAME.

René Bohn, of Mannheim, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 806,053, dated November 28, 1905.

This invention consists in the manufacture and production of a new coloring-matter from naphthazarin. It has been found that when one molecular proportion of naphthazarin is heated in aqueous solution with more than two molecular proportions of caustic soda, preferably while passing air through the mixture, the solution which is at first of a corn-flower-blue color changes gradually into a fuchsin-red and contains a new coloring-matter, and by the addition of acid to the said solution this new coloring-matter is precipitated as a brown crystalline precipitate. If less than two molecular proportions of caustic soda be employed, different color changes are observed, and the result is not that contemplated according to this invention.

The new coloring-matter dyes wool, from an acetic-acid bath,

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orange-red shades, which upon treatment with a bichromate are converted into reddish-black shades. When the new coloring-matter is printed with chromium acetate on cotton, a very fast full black is obtained of greater beauty than the shades obtained similarly with naphthazarin.

BLUE AZO DYE AND PROCESS OF MAKING SAME.

Thilo Kroeber, of Basel, Switzerland, assignor to the firm of Society of Chemical Industry in Basel. Patent No. 806,415, dated December 5, 1905.

The invention relates to the manufacture of new monoazo dye-stuffs derived from 1-amido-2-acidyloxynaphthalenesulphonic acids and naphtholsulphonic acids, according to the general process, which consists in acetylizing sulphonic acids of 1-2-amidonaphthol in the hydroxyl group, then diazotizing the so-obtained 1-amido-2-acetoxynaphthalenesulphonic acids and combining the resulting diazo compounds with naphtholsulphonic acids.

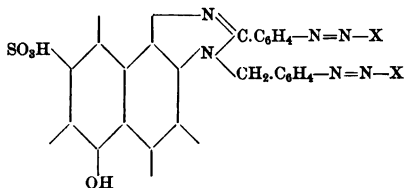
The claims specify the monoazo dyestuff, derived from 1-2-amidonaphthol-4-sulphonic acid and 1-5-naphtholsulphonic acid, which yields blue solutions in water and in concentrated sulfuric acid and dyes unmordanted wool in bordeaux shades becoming blue on treatment with chromium compounds.

RED AZO DYE AND PROCESS OF MAKING SAME.

Felix Klingemann and Georg Kalischer, of Frankfort-on-the-Main, Germany, assignors to Cassella Color Company, of New York, N. Y. Patent No. 807,119, dated December 12, 1905.

This invention is based upon the discovery that the monoazo dyes formed by combining the diazo compounds of aromatic amidoaldehydes with the sulfo acids of alpha and beta naphthol can be condensed in acid solution with the 1-2-diamido-naphthalene-5-hydroxy-7. sulphonic acid in the proportion of two molecules to one to form the diazo coloring-matters of the following constitution:

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in which X represents a mono- or disulphonic acid of alpha- or beta-naphthol. These diazo coloring-matters which in themselves are of no great value can be transformed into highly valuable products by combining them in alkaline solution with one molecule of an aromatic diazo compound. The new azo coloring-matters thus obtained are of a brilliant red color, the shade of which varies from a yellowish red to a bluish red, according to the naphtholsulphonic acid and to the diazo compound used in the preparation of the dyestuff. They have a strong affinity for cotton. The dyes obtained with them are of great fastness to washing and to acids.

YELLOW-GREEN DYE AND PROCESS OF MAKING SAME.

Charles Oswald, Hermann Lorétan, and Charles de la Harpe, of Basel, Switzerland, assignors to dyeworks, formerly L. Durand Huguenin & Co. Patent No. 807,181, dated December 12, 1905.

Formaldehyde reacts with dyestuffs of the gallocyanin series either singly in aqueous solution or in aqueous solution in presence of acids or alkalies. This reaction is facilitated by a rise of temperature or by the presence of acids. For example, the reaction occurs very rapidly and at ordinary temperature in presence of strong sulphonic acid. The proportions of formaldehyde employed may be varied. The products obtained are dyestuffs dyeing with chromium mordanted fibres yellowish green. Their solutions in concentrated sulphuric acid are green blue and turn to reddish by addition of water. Their solutions in acid-

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ulated water are rose-colored and turn to intense fuchsin red by addition of sodium nitrite. Their aqueous solutions give by addition of sodium acetate a green precipitate and by addition of alkalis a brownish precipitate. When these new yellowish-green dyestuffs are heated with water alone or with acidulated water either for a long time at 100° or for a shorter time at a higher temperature and under pressure or with aqueous solutions of certain salts—as calcium chlorid, zinc sulphate, ammonium hydrochlorid, anilin hydrochlorid—they are modified, become more easily soluble in water, and yield on with chromium mordanted fibres blue tints.

GREEN DYE AND PROCESS OF MAKING SAME.

Charles Oswald, Hermann Lorétan, and Charles de la Harpe, of Basel, Switzerland, assignors to dyeworks, formerly L. Durand Huguenin & Co. Patent No. 807,182, dated December 12, 1905.

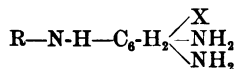
The inventors have found that by heating the yellowish-green dyestuffs described in U. S. Patent No. 807,181 by the action of formaldehyde on gallocyanin dyestuffs with neutral, acid, or alkaline reducing agents—as, for instance, stannous chlorid, zinc, aluminium, hydrosulphites, and their compounds with aldehydes, alkali sulfids, hydrogen sulphide, titanium chlorid, glucose, &c.—in a convenient medium the said dyestuffs are modified and become more soluble in water. An excess of the reducing agent does no harm. The yellowish aqueous solutions of the modified dyestuffs give by addition of sodium acetate a yellow precipitate, and these dyestuffs dye with chromium mordanted fibres vivid green tints which are a little bluer and more intense than the tints obtained with the dyestuffs which are employed as parent materials.

BROWN AZO DYE AND PROCESS OF MAKING SAME.

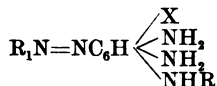
Thilo Kroeber, of Basel, Switzerland, assignor to Society of Chemical Industry in Basel. Patent No. 807,289, dated December 12, 1905.

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According to the present invention the derivatives of triamido-benzene corresponding to the general formula



(wherein R is a radical of the benzene or naphthalene series and X hydrogen, SO_3H , or COOH) are combined with orthodiazophenol derivatives for the manufacture of brown dyestuffs, which when developed by chroming are faster to copper and copper salts than are the analogous products from diamins. The triamido derivatives in question are easily obtained by condensing, for example, 1:3:4-dinitrochlorobenzene, its sulphonic acid, ($\text{NO}_2:\text{NO}_2:\text{Cl}:\text{SO}_3\text{H} = 1:3:4:5$.) or dinitrochlorobenzenesulphonic acid, ($\text{NO}_2:\text{NO}_2:\text{Cl}:\text{SO}_3\text{H} = 2:6:1:4$.) or either of the two corresponding dinitrochlorobenzoic acids, with bases of the benzene and naphthalene series, their sulphonic and carboxylic acids, and reducing the condensation products thus formed. The combination of the diazo derivatives with the triamidobenzene derivatives occurs in part, even in mineral acid solution, better in acetic acid or sodium carbonate solution. The new dyestuffs thus obtained correspond to the general formula



(wherein X signifies hydrogen, SO_3H , or COOH , R an aromatic radical, and R_1 the radical of an orthodiazophenol), and dissolve in water with yellow-brown to violet-brown coloration and give on wool in acid-bath brown tints, which become by chroming fast to light and fast to fulling.

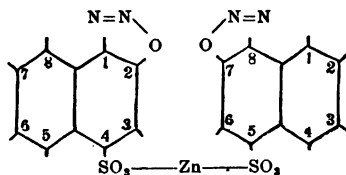
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ZINC AZONAPHTHOL DYE AND PROCESS OF MAKING SAME.

Karl Elbel, of Biebrich, Germany, assignor to the firm of Kalle and Company. Patent No. 807,422, dated December 12, 1905.

This invention relates to the manufacture of zinc compounds of the 2-oxy-sulfonaphthalene-1-azo-beta-naphthol.

If the nitrites of alkali metals and at least an equivalent amount of zinc salts (such as zinc sulfate or zinc chlorid) be allowed to act on 1-amido-2-naphtholsulphonic acids in very concentrated aqueous solution or in aqueous suspension, preferably in presence of a small amount of zinc hydroxid, the zinc salts of the diazo-oxid-sulphonic acids are obtained. If, for instance, the 1-amido-2-naphthol-4-sulphonic acid be taken as the initial product, the following compound is obtained:



This zinc salt can be recrystallized from water in needles having a bronze-like brilliancy. The diazo-oxid zinc salts obtained from the other 1-amido-2-naphtholsulphonic acid have a corresponding composition. The process for their preparation proceeds very smoothly, oxidation of the 1-amido-2-naphtholsulphonic acids not being noticeable. If the diazotized products be brought together, preferably at somewhat-elevated temperatures, with an alkaline beta-naphthol solution, zinc compounds of the 2-oxy-sulfonaphthalene 1-azo-beta-naphthols are produced, which may be used for dyeing fast blue-blacks on wool. The shades obtained on wool direct in the acid-bath are red to violet; but on subsequent treatment with bichromate they are converted into blue-blacks which are of an extraordinary fastness in all respects.

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PROCESSES OF APPLICATION.

PROCESS OF DYEING.

Heinrich Mann, of Munich, Germany. Patent No. 779,228, dated January 3, 1905.

This invention relates to the art of dyeing; and its object is to produce upon animal or vegetable fibres various color effects, such as brown, gray, or blendings of the same. It is to be distinguished in this particular from the processes which result in the production of anilin-black colors.

In carrying out this invention as bases the amin derivatives of benzene or the amin derivatives of naphthalene, as also hydroxyl derivatives of benzene and naphthalene and tertiary amins are used, all of which for the purposes of this invention are to be considered as the equivalents of the first mentioned—viz., the amin derivatives of benzene.

In carrying out the process make a solution of the amin derivatives of benzene or of one or more of the equivalents above mentioned and add to such solution a suitable metal salt and hydrogen peroxid. If any free mineral acid would result from employing the metals above indicated, such free mineral acid is neutralized and bound by the addition of a suitable salt of a fatty acid, such as an acetate, an oxalate, or a vinate. The dye-bath so formed must be of such a character that it will not color a test solution of potassium chromate blue when added thereto. Into the bath so prepared the material to be dyed is immersed, and the solution is warmed, whereupon in a short time the material will be dyed. The color produced varies with the materials employed, as will be explained hereinafter.

Substantially all the metal salts, with the exception of the salt of the alkali and alkali-earth metals, may be used in the process. More specifically stated, the metal salt is any metal salt which itself has a pronounced color—that is to say, is not white—as, for example, salts of iron, of copper, of chromium, of nickel, of

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cobalt, of manganese, of platinum, of vanadium, or of cerium. It is immaterial whether these salts contain the higher or lower equivalents of oxygen. The oxidizing agent employed is hydrogen peroxid.

PROCESS OF DYEING SILK.

Jacob Weidmann, of Paterson, New Jersey. Patent No. 780,924, dated January 24, 1905.

In this process starting with a bright, it is weighted to any desired weight with tin, as well known, with proper washing, or in the case of a souple, it is weighted to any desired weight with tin, or soupled in the tin-weighting. The bright or souple is then treated in a bath of water slightly acidulated, preferably with acetic acid, and then put into a bath of black iron of the usual strength and for the usual time. The silk is taken out of the bath, wrung out as usual, and after the proper time washed, and then placed from two to three hours in what is commonly called "the old black-iron gambier bath"—that is to say, a bath found in dye-houses consisting of the gambier bath in which previous lots coming from the black-iron bath have been dipped—the bath being preferably strengthened with fresh gambier solution, having added to it, according to the shade desired, logwood extract from thirty to fifty per cent. and fustic extract from forty to sixty per cent., both relatively according to the shade desired, and having been heated up to about 70° centigrade. The silk is next taken out and washed and placed in a logwood bath, to which is then added soap, the temperature of the bath being raised until the desired shade is obtained. The silk when taken out is of an even and perfect blue-black. It is then washed and finished with oil and acid, as usual.

HYDROSULPHITE INDIGO-VAT.

Paul Sellet, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 794,050, dated July 4, 1905.

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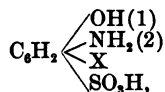
The object of the present invention is to prepare a new hydrosulphite-vat containing no free fixed alkali, but which while alkaline from the presence of ammonia is at the same time free from the various defects of the ordinary ammonium-vat. This end is attained by the combined addition to the hydrosulphite-vat of an ammonium salt and a proteid body.

The claim covers a composition of matter adapted to serve as an indigo-vat containing hydrosulphite which, when of a concentration of one (1) gram of indigo per litre of vat, and at a temperature of 50° C. and alkaline with ammonia as described, is capable of causing wool to fix on the fibre about four (4) per cent. of indigo in one dip, the duration of the operation being about twenty (20) minutes.

PROCESS OF DYEING.

Bernhard Richard, of Basel, Switzerland, assignor to Aniline Color and Extract-Works, formerly John R. Geigy. Patent No. 794,314, dated July 11, 1905.

The inventor claims that violet to blue shades of extraordinary clearness and great fastness against the action of light can be obtained on dyeing wool with certain azo dyestuffs derived from ortho-amido-phenol derivatives and on treating the dye-goods with copper salts. By the action of the copper salts the original shades varying from yellowish to blue-red are changed into violet to blue shades distinguished for their extraordinary clearness and fastness to light. The same result is to be obtained if the dyestuffs are directly dyed in presence of copper salts. These coloring-matters can be prepared by combining the diazo compounds of ortho-amido-phenol derivatives having the following general formula:



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X meaning a hydrogen atom which can be replaced by

CH_3 , NHCOCH_3 , NO_2 , halogen, SO_3H ,

with alpha-naphthylamin or ethyl-alpha-naphthylamin.

The dyestuffs obtained from ethyl-alpha-naphthylamin yield greener shades of greater clearness than those of alpha-naphthylamin.

PROCESS OF DYEING VIOLET TO BLACK.

Victor Fussgänger, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister, Lucius und Brüning. Patent No. 796,715, dated August 8, 1905.

The inventor found that new dyestuffs on the fibre may be obtained having blue, violet to black shades if para-amidodiphenylamin and its derivatives are oxidized together on the fibre with phenols, naphthols, and their ethers, oxycarboxylic acids and their esters, ortho-amidophenolethers, primary, secondary, and tertiary meta-amidophenols, alkylated and aliphylated meta-phenyldiamins, and naphthylamins, &c.

The dyes obtained are very fast to soap, soda, acid, and light. Thus, for instance, para-amidodiphenylamin with resorcin yields blue, para-amidodephenylamin with diethyl-meta-amidophenol yields greenish-blue, para-amidodiphenylamin with meta-amido-paratolyl-phenylamin yields violet, para-amido-diphenylamin with meta-oxydiphenylamin yields blue-black, para-amidodiphenylamin with thio-anilin yields deep black, para-amidodiphenylamin with gallic-acid methylester yields blue, para-amidodiphenylamin with beta-naphthol yields blue, &c. For para-amido-diphenylamin may also be used, for instance, para-amido-methyldiphenylamin, para-amidophenyltolylamin, para-amido-para-oxydiphenylamin, para-diamidodiphenylamin, dimethyl-diamidodiphenylamin, and other analogous and homologous derivatives of the diphenylamin series. As phenols and amins, for instance, may be mentioned resorcin, resorcin-alkylether, orcin, beta-naphthol, 2:7-dioxy-naphthalene and its alkylether, 2:6-dioxynaphthalene, gallic acid, gallic-acid alkylester, gallamid acid, ortho-anisidin, ortho-phenetidin, ortho-

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amidophenolbenzylether, ortho-amidiophenolchloro-benzylether, 3-amido-1-methyl-2-phenolbenzylether, di-ortho-amidophenylethylene-ether, meta-amidophenol, meta-amidocresol, mono-methyl-, mono-ethyl-, dimethyl-, diethyl-, and ethylbenzyl-meta-amidophenols and meta-amidocresols, meta-oxydiphenylamin, meta-oxyphenyl-ortho-toluidin, meta-oxyphenyl-para-tolylamin, meta-oxyphenyl-metaxylidin, meta-oxy-phenyl-alpha-naphthylamin, methyl-ethyl-, di-methyl-, diphenyl-meta-phenylenediamin, meta-amido-para-tolyl-phenylamin, methyl-meta-amido-para-toluidin, meta-diamido-di-phenyl-, and ditolylamin, meta-diamido-carbazol, ortho-amido-diphenyl, ortho-amidodiphenylamin, thio-anilin, alpha-naphthylamin, beta-naphthylamin, ethyl-diamethyl-, diethyl-, phenyl-beta-naphthylamin, &c. By oxidizing these para-amidodiphenylamin derivatives with phenols and amins the most varied shades of green-blue to red-violet and black may be obtained.

The dyes may be prepared, for instance, as follows: The two components to be oxidized are dissolved together or separately and stirred with a thickening agent to make a printing-color or padding-bath, whereupon the oxidizing agents are added. The mixture is then printed or padded on the material to be dyed, (vegetable or animal fibres,) dried, and by prolonged aeration in a warm place or by steaming the color is developed and simultaneously fixed on the fibre. The process may also be carried out by successively applying to the fibre the different components and oxidizing them in common. As oxidizing agents are specially suited the chlorates in presence or absence of carriers of oxygen.

PROCESS OF DYEING.

Carl F. Kübler, of Elmshorn, Germany. Patent No. 803,424, dated October 31, 1905.

This invention relates to a method of and apparatus for laying on and spreading over the raised pile or nap of fabrics dyes or mordants in such manner that the pile is dyed, mordanted, or bleached in one or more colors or mordants different from the ground of the fabric, while the ground itself takes little or no

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dye, the object being to provide glittering color effects, besides imparting to the fabric a full and plush-like appearance.

The improvement resides, mainly, in the feature that teasing devices or like means spread the dye or mordant over the pile of the fabric, the laying or applying of the dye or mordant being either produced by said means or by separate devices before the spreading operation.

PROCESS OF DYEING INDIGO RESISTS.

Julius Ribbert, of Hagen, Germany. Patent No. 803,855, dated November 7, 1905.

The claims cover—

1. The process for producing indigo goods, which consist in impregnating the goods with an agent acting as a reducer, printing with an ordinary paste resist commonly used for printing blue, applying indigo color, reducing said color, and then washing the goods.

2. The process for producing indigo goods, which consists in impregnating the goods with an agent acting as a reducer, printing with an ordinary paste resist commonly used for printing blue, applying indigo color, reducing said color, then dyeing said goods, and then washing the goods.

INDIGO DYE.

John W. Fries, of Winston-Salem, North Carolina. Patent No. 807,453, dated December 19, 1905.

The claims specify—

1. A padding liquor for indigo-dyeing, which consists of a mixture of indigo, milk of lime, zinc-dust, caustic soda, and starch, when mixed with a solvent.

2. A padding liquor for indigo-dyeing, which consists of a mixture of indigo, milk of lime, zinc-dust, caustic soda, starch, and alizarin-oil, when mixed with water to form a solution.

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PROCESS OF INDIGO DYEING.

Hermann Muller, of Paris, France. Patent N^o. 808,398, dated December 26, 1905.

This invention is designed to facilitate and simplify the dyeing with indigo of textile fabrics either in the piece or yarn, to reduce the time necessary for the preparation of the bath, and to effect considerable economy in the process of dyeing. The invention may be applied to the dyeing of cotton, wool, silk, linen, or unions of these fibres.

The claims cover—

1. The process of dyeing fabrics and analogous materials which consists in feeding the material through a dyeing-machine having a dye-receptacle, subjecting it to a dye-bath composed of indigo, an oxid of tin, an acid and an alkaline solution, then airing said material, and finally treating it with a fixing solution.

2. The process of dyeing fabrics and analogous materials which consists in feeding the material through a dyeing-machine having a dye-receptacle, subjecting it to a dye-bath composed of indigo, an oxid of tin, acetic acid, and an alkaline solution, then airing said material, and finally treating it with a solution of bichromate of potassium and hydrochloric acid.

PROCESS OF PRINTING WITH INDIGO.

Moritz von Gallois, of Höchst-on-the-Main, Germany, assignor to Farbwerke vorm. Meister, Lucius und Brünig. Patent No. 808,443, dated December 26, 1905.

By the present invention in printing indigo by the hydrosulfite method strong caustic alkalies are substituted for the alkali salts previously used. This substitution is particularly applicable to printing with the stable hydrosulfite compounds made by combining an aldehyde or derivative or analogue thereof with hydrosulfurous acid or a salt or double salt thereof.

By the present method white fabrics and fabrics dyed with certain other colors, such as alizarine red, may be printed.

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The claim covers—

The improvement in the process of printing fabrics with indigo on white or Turkey red dyed unprepared cotton, which consists in simultaneously applying in the printing color a mixture of indigo and stable double compounds of hydrosulphites with aldehydes and strong caustic alkalies.

CHEMICAL PROCESSES



PROCESS OF PRODUCING FATTY ACIDS.

Oscar Liebreich, of Berlin, Germany. Patent No. 778,980, dated January 3, 1905.

This invention relates to a process of producing fatty acids; and it consists in heating acidulated derivatives of aromatic bases with sulphuric acid and separating the fatty acids produced therefrom by the process.

by from the sulphates of the aromatic bases which are formed in

The value of this process depends on the fact that the acidulated derivatives of aromatic bases on a commercial scale are obtained in the form of compounds or mixtures containing the radicals of more than one fatty acid and several aromatic bases. From these compounds of acidulated derivatives of aromatic bases especially only some constituents—for instance, that containing the radical of stearic acid—are separated by fractional distillation or by other known processes for further use, whereas the remaining mixture frequently cannot be profitably employed. This invention is adapted to produce valuable products—namely, fatty acids and sulphites of aromatic bases from the said compounds of acidulated derivatives of aromatic bases. At the same time the process cheapens the production of acidulated derivatives of aromatic bases and of pure glycerin from glucerids of fatty acids, the so-called “fats” and “oils,” in accordance with U. S. Patent 741,585. In carrying out this process besides pure glycerin a mixture of several acidulated derivatives of aromatic bases is

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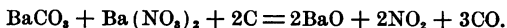
obtained. As above stated, only some constituents of such mixture are practically directly used, the others have less technical value, so that it would be desirable to dissociate same, so as to form free fatty acids and to regenerate the aromatic bases. This invention realizes this effect and therefore by the combination of the former process forming the subject-matter U. S. Patent No. 741,585 with the process of this invention by the treatment of fats or oils in the first place by heating the fats or oils with aromatic bases, acidulated derivatives of aromatic bases and anhydrous glycerin are obtained, and in the second place, by heating the compound of acidulated derivatives of aromatic bases with sulphuric acid, fatty acids and sulphates of aromatic bases.

PROCESS OF PRODUCING BARIUM OXID FROM BARIUM CARBONATE.

George Egly, of Charlottenburg, Germany, assignor to the firm Gebrüder Siemens & Co. Patent No. 779,210, dated January 3, 1905.

The inventor claims by this invention barium oxid of a high degree of porosity can be obtained from barium carbonate at a temperature which renders the working more expeditious and economical, while any destruction of the containing vessels which may occur in consequence of the high temperatures hitherto employed is avoided. In fact, in the practice of the novel process barium oxide may be produced when the process is practiced by heating the material to a red heat, it being well understood in the art, as before stated, that in the manufacture of such oxids heretofore it has been absolutely necessary that the clearest white heat be produced to effect the result sought. For this purpose the barium carbonate before being heated is mixed with barium nitrate with or without the addition of a reducing agent, such as carbon or a substance which carbonizes when heated—for instance, tar, syrup. Volatile hydrocarbons may also be added in order to increase the porosity of the product. The reaction takes place according to the formula:

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The addition of barium nitrate has for its object that the decomposition of the carbonate already takes place when nitrous vapors are just beginning to develop from the nitrate. The porosity of the product obtained in this manner is almost the same as that of the products obtained from pure nitrate.

PROCESS OF MAKING SODIUM ACETATE.

Iens P. Lihme, of Cleveland, Ohio, assignor to the Grasselli Chemical Company. Patent No. 779,290, dated January 3, 1905.

This process is as follows: The commercial calcium acetate is dissolved in a large tank suitably heated to further complete solution and chemical reaction. Sodium sulfate is then added to this solution in quantities slightly in excess of that required to complete the reaction with the calcium salt, being thoroughly stirred meanwhile. This is added in solid form. The said solution is further heated to insure the completion of the reaction, after which barium carbonate is added to the solution, which may or may not be separated from the precipitated calcium sulphate in order to throw down the percentage of that salt remaining dissolved in the acetate solution, it being found that the resulting calcium carbonate and barium sulphate are practically insoluble in said solution. The heating is continued during this last reaction, which results in the precipitate seizing upon further portions of organic matter and carrying the same down, to the end that the acetate solution is practically freed therefrom. These two reactions described leave a highly-purified solution of sodium acetate, with a fractional percentage of sodium carbonate, which is negligible. Sodium sulphate, however, is entirely eliminated from the mother-liquor, and this is a point of much importance in the manufacture of sodium acetate. The decanted solution is run into concentrating-tanks, where it is again heated and slowly evaporated until ready to crystallize, whereupon it is conducted to crystallizing-tanks. Jets of air are constantly supplied to the

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solution during this step of the process, extending over some forty-eight hours, if necessary, which serves to cool the solution and oxidize practically all of the organic impurities that may remain after the foregoing steps.

PROCESS OF MAKING HYDROCHLORIC ACID.

William T. Gibbs, of Buckingham, Canada, assignor to the Electric Reduction Company, Limited, of Buckingham, Canada. Patent No. 779,998, dated January 10, 1905.

This invention relates to an improved method of combining hydrogen and chlorin gas, especially for the production of hydrochloric acid, by which danger of explosion is avoided and all the chlorin is combined, so that the objectionable escape of free chlorin is prevented.

The inventor has discovered that it is possible to obtain complete combination of chlorin gas with hydrogen without any danger of explosion by heating one or both of the gases to a temperature above that at which combination of the two gases commences and then passing one gas through a jet or pipe in a continuous stream into an atmosphere of the other gas. Under these conditions quiet combustion commences at the instant the gases come into contact, and no mixture of the gases in an uncombined state is possible, so that no explosion can take place.

It is not essential that both gases be previously heated, and either gas may be delivered into an atmosphere of the other gas; but preferably the chlorin gas is passed into an atmosphere of hydrogen in quantity slightly greater than is needed to combine with all the chlorin introduced.

PROCESS OF OXIDIZING METHYL GROUPS IN AROMATIC HYDROCARBONS.

Max Bazlen and Hans Labhardt, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 780,404, dated January 17, 1905.

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The inventors have discovered that the acid solution of manganese persulphate has the property of oxidizing the side chains—that is, the methyl or substituted methyl group—in aromatic hydrocarbons and their derivatives, so as to convert them into the aldehyde group. This new reagent acts in a different way from and is far better suited for use for this purpose than is a mixture of manganese peroxid and sulphuric acid. The reaction proceeds energetically under conditions under which manganese peroxid and sulphuric acid have practically no action. The new process is of very general application. Toluene gives a good yield of benzaldehyde, and the homologues of toluene and its substitution products, as also benzyl alcohol and its esters, behave similarly. The process is of particular value for the production of orthonitrobenzaldehyde from orthonitrotoluene, for the yield of this body that can be obtained by the new process is twice as great as that hitherto obtained by the best-known process from orthonitrobenzaldehyde, manganese peroxid, and concentrated sulphuric acid.

If the oxidation be conducted more energetically—for instance, by the use of a higher temperature and a sufficient quantity of oxidizing agent—the corresponding carboxylic acids can be obtained in some cases in admixture with aldehydes.

The new process has the further advantage that the resulting sulphuric-acid solution of manganous sulphate can readily be converted by electrolytic oxidation into manganese persulphate which can again be used, whereas it has not generally paid to regenerate the manganese peroxid hitherto used when oxidizing with this reagent and sulphuric acid.

PROCESS OF PURIFYING INDIGO.

Rudolf Hutzler, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 780,886, dated January 24, 1905.

Indigo, both natural and synthetic, frequently contains, as is known, certain impurities. The inventor claims that these im-

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purities can be removed by treating the indigo to be purified with a phenol (which may be etherfied) in such quantity that only the aforesaid impurities are removed, while the indigo remains undissolved. As phenols there can be employed carbolic acid, cresol, naphthol, or the like, or the ethers of these compounds.

PROCESS OF MAKING THE DOUBLE SULPHATE OF ALUMINUM AND SODIUM.

George E. Hipp, of Buffalo, New York. Patent No. 781,341, dated January 31, 1905.

This invention relates to a process of manufacturing double sulphate of aluminum and sodium by compounding nitre-cake, (sodium bisulphate,) sulphide of an alkali metal, bauxite clay, or other aluminous product, sulphate-of-aluminum liquid, free acid, and calcining and otherwise treating the ingredients, as will be fully described hereinafter.

The objects of this invention are to render the manufacturing of double sulphate of aluminum and sodium more economical, much cheaper, and more expeditious than has heretofore been possible, to extract all arsenic and lead, which are considered injurious, and provide a substitute which is much cheaper than cream of tartar and has all the necessary qualities of the same, and also to provide a double sulphate of aluminum and sodium, of which a given quantity will neutralize a corresponding quantity of bicarbonate of soda.

PROCESS OF MAKING CYANIDS.

Joseph Teherniac, of Freiburg, Germany. Patent No. 781,472, dated January 31, 1905.

In the specification to U. S. Patent No. 747,271 is described the manufacture of cyanids by oxidizing a sulphocyanid and absorbing the hydrogen cyanid by a heated alkali carbonate or hydroxid.

The present invention relates to an improvement in the use of alkali hydroxid as an absorbent for the hydrogen cyanid.

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The inventor finds that to obtain a high-grade colorless cyanid the alkali hydroxid must be heated to a temperature below its melting-point, but above that at which the water generated by the reaction is completely vaporized. The hydroxid should be finely divided, and although the temperature must at first be below that at which the hydroxid melts it may be raised gradually as the latter becomes converted into cyanid. For instance, when caustic soda is used the temperature may be 200° C. to begin with. Some fifty to sixty per cent. of the caustic soda will become cyanid at this temperature. To complete the conversion, the temperature may be raised to 300° C., which may be done without danger, as the melting-point of the mass rises considerably as the formation of cyanid proceeds. Instead of raising the temperature the mass may be broken up or ground and the temperature maintained at 200° C. until the soda is saturated. By working in this manner and using two or three absorption apparatus in series the soda is completely saturated and the hydrogen cyanid fully absorbed.

The cyanid produced is of high grade and quite white.

PROCESS OF EMULSIFYING RESIN SOAP IN WATER.

Max Erfurt, of Straupitz, near Hirschberg, Germany. Patent No. 781,506, dated January 31, 1905.

The manufacture of sizing out of resin soap—*i.e.*, an emulsion of resin soap with hot water—is the more difficult the more free resin is contained in the resin soap. In the ordinary processes of manufacture separation of raw resin takes place, causes considerable loss of product, and may render the resulting sizing unfit for use.

The present invention has for its object a process by means of which resin soap with an admixture of as high as one hundred per cent. free resin can readily be emulsified in hot water. The result is a resin soap of a very high percentage of free resin and of correspondingly good gluing properties, also a great saving in alum.

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The claim covers a process for emulsifying resin soap in water, consisting in heating resin soap, mixing it with water under steam-pressure and injecting the heated mixture in atomized state into lime-water, for the purpose of bringing about perfect emulsion.

PROCESS OF MAKING NITRIC ACID.

Henry William Hemingway, of Walthamstow, England. Patent No. 781,826, dated February 7, 1905.

In carrying out this process nitrate of soda or nitrate of potash are added to sulphuric acid, together with a suitable quantity of water, the quantity of sulfuric acid being slightly in excess of that necessary for combining with the soda (or potash). The mixture is made in an earthenware retort or covered pan so constructed that the temperature can be raised to 170° Fahrenheit, provision being made for carrying away the vapors yielded and conducting them through a series of Woulfe's bottles, towers, or other form of condensing apparatus. The mixture having been heated to about the before-mentioned temperature, protosulphate of iron is added (common green copperas) either continuously or in frequent small charges. The protosulphate of iron becomes oxidized at the expense of the nitrate of soda (or of potash) and nitrous fumes are generated. On these being condensed and air being admitted nitric acid is formed.

PROCESS OF OBTAINING OXYGEN.

George Francois Jaubert, of Paris, France. Patent No. 782,609, dated February 14, 1905.

In previous applications for Letters Patent a process is described for preparing a powder containing chlorid of lime, sulphates of copper, and iron, the said powder by the action of water spontaneously evolving oxygen. From the point of view of properly preserving the product it is preferable to mix the sulphate of iron (or of manganese) only at the moment of use, because the sulphate of iron becomes transformed after a time into the little active

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ferrie sulphate. It is expedient, therefore, to proceed as follows: One hundred kilos of dry chlorid of lime are pulverized with five kilos of sulphate of copper, of nickel, of cobalt, or other suitable salt. A white powder is thus obtained which keeps very well and which generates oxygen when merely placed into a fifteen-per-cent. solution of sulfate of iron or of manganese.

PROCESS OF MANUFACTURING WHITE LEAD.

Willson H. Rowley and John H. Montgomery, of St. Louis, Missouri, assignors of one-third to Martin Shaughnessy. Patent No. 785,023, dated March 14, 1905.

In manufacturing white lead by this process the lead is first melted in a kettle which is mounted over a furnace conveniently located. A conducting-pipe leads from the lower end of the kettle and extends into a receptacle. An air-chamber surrounds the end of the pipe, and air-pipes lead through the furnace under the kettle into the air-chamber and the air is heated as it passes through the pipes and is forced into the air-chamber. An opening is formed through the air-chamber around the inner end of the nozzle of the pipe, through which the heated air is forced to simultaneously atomize and partially oxidize the lead as it pours through the pipe. Water-spraying pipes extend across the upper side of the receptacle and the water is sprayed through the pipes and acts upon the atomized and oxidized lead, causing it to fall to the trough-shaped bottom of the receptacle, where it is moved by a carrier to the outlets, formed at one end of the receptacle. The fine particles of oxidized lead are then delivered into the common grinding-mill, where they are ground by means of the grinding-disks, which remove a portion of the surface oxid from the oxid-laden particles. After being thoroughly ground by the disk the oxidized lead and water are delivered out of the receptacle into an agitating chamber. The lead is, as before described, first partially oxidized by the action of the heated air as it leaves the mouth of the nozzle in the air-chamber, and the water entering the room or receptacle creates a moisture therein, which

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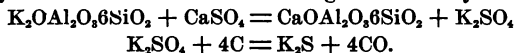
assists further oxidation of the lead. The suboxid-laden particles of lead are further oxidized in their course through the grinding-disks, and the residual metallic lead, if any, is then separated by precipitation, and the comminuted suboxid of lead may be conveyed to a rotary receptacle where it is subjected to air and carbonic-acid gas to form a carbonate of lead, commonly known as "white lead."

PROCESS OF MAKING POTASSIUM SALTS.

Aurelius J. Swayze, of Danville, New Jersey. Patent No. 789,074, dated May 2, 1905.

The process comprises the production of potassium salts in the form of sulphate and sulphide by fusing potash-feldspar with gypsum in contact with a reducing agent, as carbon in the form of coke or coal.

Potash-feldspar (orthoclase, $K_2OAl_2O_6SiO_2$) and gypsum ($CaSO_4$) in the presence of a reducing agent, such as coke or coal, are fused in a blast-furnace. The materials are used in a crushed state, preferably about the size of pea-coal, and the furnace is of ordinary construction, except that the exit-pipe has water in the form of spray injected therein to wash out the volatilized products. The fusion of the materials will result in the production of potassium sulphate (K_2SO_4) and calcium-aluminum silicate, ($CaOAl_2O_6SiO_2$), and at a high heat in the presence of the reducing agent the reduction of the sulphate to sulphide (K_2S) and the evolution of carbon monoxid (CO) is affected, theoretically the reactions which occur being substantially as follows:



The potassium salts are volatilized and pass out through the exit-pipe of the furnace and are thereby recovered from the slag.

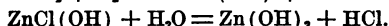
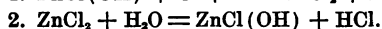
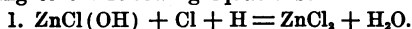
PROCESS OF MAKING HYDROHALOGENIC ACID.

Felix Wilhelm Westhausser, of Hohenheim, near Stuttgart, Germany. Patent No. 791,306, dated May 30, 1905.

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The present invention relates to a process for the production of hydrohalogenic acid, and more especially of hydrochloric acid and of hydrobromic acid.

The new process is based, on the one hand, on the observation that a mechanical mixture of chlorin and hydrogen is taken up by basic chlorids or oxy-chlorids and hydroxids under conditions stated below, a chlorid and water being formed, and, on the other hand, on the fact in itself well known that various chlorids of metals—as, for example in particular, aluminium chlorid, zinc chlorid, and chlorid of tin—if they are heated in the presence of water are decomposed partially into basic chlorids or hydroxids (on the heating being continued, into oxids) and hydrochloric acid. The additional observation is of importance, that the basic chlorids or hydroxids hereby formed can be always practically utilized again for the operation of the taking up of chlorin and hydrogen, with the formation of a chlorid and water. The reactions in the case of the use of zinc compounds, for example, proceed according to the following equations:



The above-mentioned property is also shown by the aqueous solutions of the metal chlorids in question, such solutions showing an acid reaction which can be recognized by means of litmus, a phenomenon which indicates that a decomposition into basic chlorid or hydroxid and hydrochloric acid has already occurred.

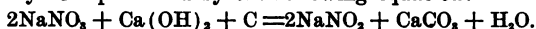
PROCESS OF MAKING NITRITES.

Jacob Grossmann, of Manchester, England. Patent No. 792,515, dated June 13, 1905.

It is known that when nitrate of soda is fused with carbon in the presence of caustic alkali, nitrite of soda is produced, and as caustic soda has to be used in excess, the resulting melt contains four salts which are easily soluble and which on lixiviation go into solution—vi., sodium nitrite, nitrate, carbonate, and hydrate—be-

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sides silicates and other impurities. This interferes seriously with the subsequent separation and purification of the nitrite. In order to overcome this objection, the oxid or hydrate of an alkaline earth is used instead of caustic alkali. The reaction which takes place may be represented by the following equation:



It will be seen that the only possible substances which on dissolving the melt can go into solution are the nitrite formed and whatever nitrate has not been decomposed, and as the resulting liquor may be boiled down to dryness and melted again with more caustic earth and carbon the ultimate products obtained in solution will be nitrite of soda and a small percentage of undecomposed niter free from other soluble compounds. Instead of the oxid or hydrate of calcium the oxid or hydrate of barium, strontium, or magnesium may be used. A small proportion of caustic alkali may be mixed with the lime or added to the melt to act as a carrier. The yield of nitrite and the loss in niter by overreduction and similar causes depends on the allotropic form of carbon used. The yield is highest and the loss in niter least in the case of graphite, natural or refined or artificial. Coke comes next and other forms of carbon after that.

PROCESS OF MAKING HYDROSULPHITES.

Louis Descamps, of Lille, France. Patent No. 791,675, dated June 6, 1905.

This process consists in the quick addition of a reducing-powder—such as zinc, iron, tin, or the like—in a very fine and pure condition and in quantity slightly in excess of that theoretically required to a concentrated solution of sulphurous acid of industrial purity—that is, as free as possible from other acids and impurities. The solution may be an aqueous, alcoholic, glycerinous, or other solution of sulphurous acid. The mixture is stirred quickly, then allowed to deposit, and the solution finally decanted. It is of great importance that the whole of the sulphurous acid be transformed into hydrosulphite, and therefore the reducing-powder,

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such as zinc, must be in slight excess, as heretofore stated, for if even a single molecule of the acid should remain free a decomposition will take place. By thus instantaneously adding the whole quantity of the reducing-powder to the sulphurous acid the temperature of the liquid mass suddenly rises. It is not necessary to prevent this by cooling, as, if not excessive, it is essential for instantaneously and completely succeeding with the reaction. This rapid action at an elevated temperature is of great importance, for the product is easily decomposed if the whole of the acid is not transformed. After having brought the reaction to an end, allow the slight undissolved excess of the reducing-powder and the impurities that might be present in spite of all precautions to deposit and decant the liquid. The zinc hydrosulphite thus obtained is ready to be used in reducing indigo or for other purposes, or the solution can be transformed into other hydrosulphites by addition of either bases, like lime, sodium hydrate, baryta, &c., or salts acting by double decomposition, such as acetate of calcium or of barium or the like.

PROCESS OF MAKING HYDROCYANIC ACID FROM IRON-CYANOGEN COMPOUNDS.

Walther Feld, of Hönnigen-on-the-Rhine, Germany. Patent No. 792,889, dated June 20, 1905.

This invention is based on the discovery that mercuric chloride is more suitable than mercuric oxide or mercuric sulphate for manufacturing hydrocyanic acid from iron-cyanid compounds. First, the decomposition of the iron-cyanid compounds is more complete by mercuric chlorid; secondly, metallic mercury will not be separated, because in decomposing ferricyanid compounds no reduction enters, whereas in decomposing ferrocyanid compounds the mercuric chlorid (HgCl_2) used is only reduced to mercurous chlorid, (Hg_2Cl_2) but not to metallic mercury, and, thirdly, the mercuric chlorid can be used in neutral, acid, or alkaline solution. This process is adapted for application to all materials containing iron-cyanid compounds—for example, gas-purifying materials,

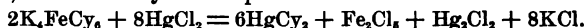
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Prussian blue, ferrocyanid and ferricyanid compounds, &c. It is unimportant whether the compounds are soluble or insoluble.

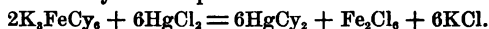
For carrying out the invention the materials to be decomposed are treated with the required quantity of mercuric chlorid, preferably in solution. The solution is then heated, the reaction being effected most rapidly at boiling temperature.

The reactions may be expressed as follows:

(1) With ferrocyanid of potassium:



(2) With ferricyanid of potassium:



(3) With Prussian blue:



If the materials used contain free acid, then the mercuric cyanid formed during the reaction is at once decomposed, yielding hydrocyanic acid.

FORMALDEHYDE SULPHOXYLATE AND PROCESS OF MAKING SAME.

Max Bazlen and Theodor Wohlfahrt, of Ludwigshafen-on-the-Rhine, Germany, assigns to Badische Anilin und Soda Fabrik. Patent No. 793,559, dated June 27, 1905.

The inventors have discovered that by allowing one molecular proportion of a hydrosulphite and one molecular proportion of formaldehyde to react on one another in the presence of caustic alkali or of an alkaline earth salts of formaldehyde sulphonylic acid can be obtained easily and in good yield, and at the same time a normal sulphite is formed which does not combine with formaldehyde and can easily be removed from the aforesaid compound by any suitable method—such, for instance, as by evaporating the solution till the sulphite salt crystallizes out or by precipitation by the addition of alcohol. Instead of formaldehyde other equivalent aldehyde—such, for instance, as acetaldehyde or benzaldehyde may be employed and corresponding compounds be obtained. The salts of formaldehyde sulphonylic acid thus obtained are claimed else-

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where; but what are claimed specifically are the new process for the manufacture of these bodies and the new specific sulphoxylic—namely, the monocalcium salt of formaldehyde sulphoxylic acid. This salt is easily soluble in water and reduces indigo carmine upon heating, which capacity is not increased by treatment with zinc-dust and acetic acid, it is difficultly soluble in absolute methyl alcohol and contains no formaldehyde bisulphite compound, and upon addition of a solution of sodium carbonate to its aqueous solution yields a white precipitate. Upon titration in neutral solution with iodine this compound requires more than three atomic proportions of iodine to each atomic proportion of sulphur present. When heated, it does not melt.

PROCESS OF MAKING DIAZO COMPOUNDS.

Traugott Sandmeyer, of Basel, Switzerland, assignor to Aniline Color and Extract Works, formerly John R. Geigy. Patent No. 793,743, dated July 4, 1905.

This invention is based upon the discovery that sulpho-acids of the 1-amido-2-naphthol can be transformed under certain conditions into the corresponding diazo compounds or sulfo-acids of the naphthalene-1-2-diazo oxid, (Bamberger, *Ber.*, XXVII., 683,) which new diazo compounds are obtained in pure and dry state in the form of free sulphonic acids or their salts. Hitherto by diazotizing the aforesaid sulphonic acids of the 1-amido-2-naphthol in the usual manner—namely, in the presence of free mineral acids—the nitrous acid reacts chiefly as oxidizing agent transforming the amidonaphthol sulphonic acids mostly into naphthoquinone sulphonic acids. It is now found that without an addition of a mineral acid, but only by mixture of a 1-amido-2-naphthol-mono or polysulphonic acid or its acid salt with a solution of sodium nitrite, an easy and complete diazotation takes place if a proportionally small quantity of a neutral copper salt has been first added to the sulphuric acid or to the sodium nitrite. In a limited measure the same catalytic effects are also shown by other metallic salts, especially iron salts.

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PROCESS OF MAKING INDIGO-WHITE.

Paul Seidel and Robert Wimmer, of Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin und Soda Fabrik. Patent No. 794,049, dated July 4, 1905.

When manufacturing indigo according to the more important processes, indoxyl and indoxyllic acid, hereinafter referred to as "indoxyllic bodies," are obtained as intermediate products, and these are oxidized to indigo. For use the indigo has to be reduced again to indigo-white. No process by which indoxyllic bodies could be oxidized to indigo-white has hitherto been known, but it is now discovered that indoxyllic bodies can be oxidized to indigo-white by using a quantity of oxidizing agent insufficient to oxidize the whole to indigo, and it is claimed that indigo is itself a suitable oxidizing agent for oxidizing indoxyllic bodies to indigo-white, and at the same time it is itself reduced to indigo-white. For example, by blowing through a solution of an indoxyllic body a quantity of air sufficient to oxidize the whole to indigo-white, but insufficient to oxidize it all to indigo, or when indigo is used as the oxidizing agent by acting upon a quantity of an indoxyllic body with such a quantity of indigo, a solution containing practically only indigo-white results. It is not necessary to isolate the indoxyl and indoxyllic acid before carrying out this reaction, as the alkaline melt obtained in the usual preparation of these compounds can be employed. By using a small quantity of certain bodies, which we call "oxygen-carriers"—such as iron salts, alkali sulfites, &c.—the speed of this reaction is increased. The alkali solution of indigo-white which results in either of the foregoing cases can be filtered from any indigo which is present and can be further treated as desired.

PROCESS OF CHEMICALLY MODIFYING OILS.

Eduard Meusel, of Liegnitz, Germany. Patent No. 794,373, dated July 11, 1905.

The present invention has for its object the industrial appli-

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cation of denitrificating bacteria for breaking up the nitrogenous substances to permit of the oxygen therein contained uniting with the fatty oils to change their chemical constitution, whereby modified oils are produced suitable for many varied uses in the industrial arts due to the peculiar qualities imparted thereto by this chemical change.

In this process a culture of denitrificating bacteria—such as, for instance, cheese bacteria—is mixed with one kilogram of a fatty oil and two liters of a five-per-cent. solution of nitre, with addition of suitable nutritive salts, the mixture being thoroughly shaken for the purpose of effecting a good airing. It is expedient to add chips of wood in order to accomplish as thorough a mingling as practicable of the oil with the solution of salt and the denitrificating bacteria and to effect an energetic airing. The reaction takes place in the best and quickest manner at about 30° centigrade. According to the kind of denitrificating bacteria and oils the reaction takes a longer or shorter time. After the modified oil produced has been freed from the aqueous solution containing glycerin it possesses a more or less modified consistency, the acid number is very high, and the iodine number is often greatly changed. The products obtained in this manner are easily soluble in a dilute solution of soda.

The modified oils are excellently adapted for the manufacture of degreas, lacquers, mordants for dyes, and like substances.

PROCESS OF MAKING ALUMINIUM COMPOUNDS.

Lucius Richard Keogh, of Hamilton, Canada. Patent No. 794,413, dated July 11, 1905.

The object of the invention is to provide a new and improved method of making, as products, aluminum compounds and by-products, such as aluminum sulphate, aluminate of soda, anhydrous alumina, hydrated alumina, sodium sulphate, sodium sulphide, sodium carbonate, hydrochloric acid, sulphureted hydrogen, sulphur dioxide, sulphur trioxide, sulphuric acid, sulphur, sulphide of iron, sulphate of iron, and other substances that may

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be contained in the raw materials—viz., aluminous minerals, pyrites, coal or other form of carbonaceous material, sodium chlorid, sodium sulphates, alumina, sulphates of alumina, and furnace or burner gases.

The process consists, essentially, in heating charges composed of mixtures of raw materials above mentioned in the presence of steam and sulphur compounds to form products, as above shown.

PROCESS OF MAKING CARBON TETRACHLORID.

Joseph Louis Danziger, of New York, N. Y., assignor to Castner Electrolytic Alkali Company. Patent No. 794,789, dated July 18, 1905.

In this process the inducing cause of the reaction is a metal or metals—to wit, amalgamated aluminium or its equivalent—said amalgamated aluminium remaining substantially unchanged throughout the process and unconverted into metallic chlorid. It follows, therefore, that the carbon-tetrachlorid process, calling for the use of amalgamated aluminium or its equivalent, is radically different from any process calling for the use of iron filings or of iron chlorid. Furthermore, the process has large advantages over the old carbon-tetrachlorid process. Some of these advantages are as follows: The use of the amalgamated aluminium gives a greatly-increased yield of carbon tetrachlorid. The reaction is far less violent, is more easily carried out, and takes less time. No metallic chlorid is formed, and consequently no gummy tarry mass is formed as a by-product of the reaction, and consequently in my process there is no difficulty arising from the necessity of handling and separating such gummy by-product. A much smaller amount of amalgamated aluminium will bring about the reaction in accordance with this process than if iron were used as per the old method, and the amalgamated aluminium, since it remains unattacked, can be used over and over again, provided suitable precautions are taken to keep it out of contact with the air.

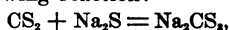
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PROCESS OF PURIFYING CARBON TETRACHLORID.

Joseph Louis Danziger, of New York, N. Y., assignor to Castner Electrolytic Alkali Company. Patent No. 794,970, dated July 18, 1905.

This invention relates to a process for purifying carbon tetrachlorid by removing impurities therefrom, consisting more especially of carbon bisulphide and sulphur chlorid.

In carrying out this process the crude tetrachlorid is digested with a sulphide solution, said solution being preferably a strong sodium-sulphide solution containing free alkali. In order to hasten the operation, the solution is warmed, a return-condenser being used. Any impurity of carbon bisulphide present in the tetrachlorid is removed, as thiocarbonate, in accordance, for example, with the following reaction:



whereas any impurity of sulphur chlorid is decomposed by the water present into sulphur, sulphurous acid, and hydrochloric acid, the said acids combining with the free alkali of the sulfid solution to form salts. After the impurities have been removed the digestion is stopped and the carbon tetrachlorid forming, as it will, a layer distinct from the supernatant sulfid solution is separated and may then be dried and redistilled, thus yielding pure tetrachlorid.

PROCESS OF MAKING UREA.

Hans Foersterling and Herbert Philipp, of Perth Amboy, New Jersey, assignors to the Roessler & Hasslacher Chemical Company. Patent No. 796,713, dated August 8, 1905.

This invention relates to a new and useful process of manufacture of urea based upon the reaction of a cyanamid metallic salt in the presence of an acid.

The process is as follows: A concentrated solution of sodium cyanamid is slowly introduced into any acid, preferably sulphuric acid on account of its cheapness. The sulphuric acid is agitated while the sodium-cyanamid solution is being introduced, as the

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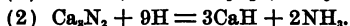
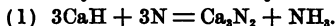
reaction is very vehement and must not be allowed to localize, as it would then be liable to eject the contents of the vessel. The reaction with concentrated sulphuric acid is so vehement that it is preferable to use a more dilute acid. It is essential that the sodium-cyanamid solution should be added to the sulphuric acid, and not vice versa, and that the amount of acid should be such that when all the portion of the sodium cyanamid has been added the liquid still remains on the acid side, which can from time to time during the process be ascertained by testing with litmus-paper. Should the solution through lack of acid become alkaline, then part of the cyanamid is converted into dicyanamid, and yield of urea is greatly diminished and is very hard to get in a pure form.

PROCESS OF MAKING AMMONIA.

Karl Kaiser, of Berlin, Germany. Patent No. 797,961, dated August 22, 1905.

This process is based upon the observation that when calcium hydrid, a compound which is defined by some as corresponding to the formula CaH , by others to the formula CaH_2 , is heated and subjected to the action of nitrogen ammonia is produced and the calcium hydrid is transformed into calcium nitrid, (Ca_2N_2) . This substance when heated and subjected to the action of hydrogen again produces ammonia and is retransformed into the hydrid of calcium.

The two processes may be illustrated by the equations:



It will be seen that thus a circular process is obtained in which every operation produces ammonia.

PROCESS OF MAKING AMMONIA.

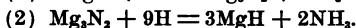
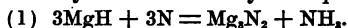
Karl Kaiser, of Berlin, Germany. Patent No. 797,962, dated August 22, 1905.

This method is based upon the observation that when magne-

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sium hydrid, a compound which is defined by some as corresponding to the formula MgH , by others to the formula MgH_2 , is heated and subjected to the action of nitrogen ammonia is produced and the magnesium hydrid is transformed into magnesium nitrid, (Mg_3N_2). This substance when heated and subjected to the action of hydrogen again produces ammonia and is retransformed into the hydrid of magnesium.

The two processes may be illustrated by the equations:



It will be seen that thus a circular process is obtained in which every operation produces ammonia.

PROCESS OF MAKING INDOLIC BODIES.

Paul Seidel, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 798,077, dated August 29, 1905.

The inventor claims that indol or indolic bodies are contained in and can be isolated from melts such as are obtained by heating bodies containing the chemical group $R-N-CH_2-CO$ (in which R signifies an aromatic radical)—for instance, bodies such as phenyl-glycin, tolyl-glycin, phenyl-glycin-ortho-carboxylic acid, a salt, ester, amid, anilid, or anhydrid of one of these bodies, and the like, with alkaline dehydrating agents, such as hydroxids or oxids of the alkalies or alkali earths, either alone or in admixture with inorganic bodies which decompose water.

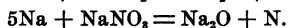
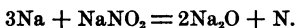
This invention is an improvement in the manufacture of indigo, for from the waste liquors a valuable by-product is recovered, thus cheapening the manufacture of indigo itself. Further, by varying the conditions of the melting operation the quantity of the by-product is increased for the quantity of indol formed apparently increases (within certain limits) with the temperature. The addition to the melt of reducing agents—such as finely-divided iron powder, sulphite salts, sodium ethylate, and the like—also augments the yield of indol.

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PROCESS OF MAKING ALKALINE-METAL OXID.

Rudolf Hutzler, of Ludwigshafen-on-the-Rhine, Germany, assignor to the Badische Anilin und Soda Fabrik. Patent No. 798,103, dated August 29, 1905.

It is discovered that by taking suitable precautions "alkali nitrates" including the nitrates of the alkali-earth can be caused to react with alkali metal in an entirely different manner from that hitherto observed between alkali nitrate and alkali metal—namely, so as to form practically pure alkali oxid, either alone or in admixture with another alkali oxid or alkali-earth oxid, or both. As equivalents of the nitrates in the process the corresponding nitrites can be employed, in which case the reaction proceeds more quietly, less alkali metal is required, and the apparatus is not attacked so much as when working with the nitrate. When using sodium and sodium nitrate or sodium nitrite, for example, reaction appears to proceed in accordance with the following equations:



From the above it is possible to calculate the quantities of the reacting materials required to produce the greatest yield of alkali oxid, and to obtain the best results it is essential to exclude air as far as possible from the reaction. On account of the difficulty of excluding all air from the vessels in which the reaction takes place it is preferable to employ a slight excess of the alkali metal in order to counteract the effects of such air. When operating so as to produce potassium oxid, it is necessary that the nitrate or nitrite employed be not in excess of the quantity theoretically necessary to convert the alkali metal into alkali oxid if it is desired to avoid the formation of potassium superoxid, for potassium oxid is oxidized by an excess of nitrate or nitrite to potassium superoxid even at temperatures at which such salt does not give off any free oxygen. Sodium oxid, on the other hand, is not so sensitive to oxidizing agents and is not acted on by excess of

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nitrate or nitrite, provided either of these latter is not heated beyond its decomposing-point.

PROCESS OF MAKING NITRIC ACID.

Heinrich Hugo Niedenführ, of Halensee, Germany. Patent No. 798,205, dated August 29, 1905.

This invention refers to a process for manufacturing nitric acid by means of which it is possible to effect a practically perfect condensation of the nitric-acid vapors and the removal of the lower oxids of nitrogen, the latter being at the same time submitted to a practically complete condensation and oxidation into nitric acid.

This process practically consists in treating nitrates with a suitable acid and generating fumes of oxids of nitrogen substantially without foreign oxidizing agents, treating the concentrated and undiluted fumes evolved to an immediate condensation process out of contact with said nitrates at a comparatively high temperature and at a somewhat-reduced pressure, separating the condensed and liquefied nitric acid from the uncondensed gaseous lower oxids of nitrogen and preventing any substantial absorption of the said oxids by the liquid, then condensing said gaseous lower oxids of nitrogen at a lower temperature and at an increased pressure and in contact with the liquefied portion of said gaseous oxids, keeping said lower oxids under pressure and at a low temperature until practically all of the gas is condensed and collecting the resulting liquefied lower oxids and oxidizing the same.

PROCESS OF MAKING SODIUM FERROCYNANID.

Camille Petri, of Buchsweiler, Germany. Patent No. 798,208, dated August 29, 1905.

This invention is based on the discovery of the fact that sodium ferrocyanid, which is formed by the addition of sodium chlorids to a solution of calcium ferrocyanid according to the formula



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admits a ready separation from the simultaneously-produced chlorid of calcium. The sodium ferrocyanid thus formed may be obtained from the solution by crystallization as well as by separation in concentrating the same, while the simultaneously-formed chlorid of calcium remains in solution in view of its being considerably more soluble at any temperature, so that it may be easily separated from the sodium ferrocyanid. It may be stated that the above effect is obtained without the use of sodium carbonate in conjunction with sodium chlorid. The production and the separation of the sodium ferrocyanid takes place very easily from that reason also, because it has been ascertained that there is no subsequent decomposition of the sodium ferrocyanid upon evaporating the solution.

PROCESS OF MAKING SULPHURIC ACID.

Rudolf Knietisch, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 800,218, dated September 26, 1905.

In the specification of Letters Patent No. 652,119 is described a catalytic process for the production of sulphuric acid, in which process the gases from the pyrites-burners are before their combination to sulphuric anhydrid thoroughly purified from all injurious impurities, and finally an acid is obtained which is entirely free from arsenic, nitrous compounds, and lead. The commercial acid obtained by this process contains as sole impurity a small quantity of iron. The iron is introduced owing to the practical necessity of effecting the absorption of the sulphuric anhydrid first formed in iron apparatus. The present invention provides an improvement in this manufacture whereby commercial sulphuric acid can be obtained directly, which acid is for technical purposes practically free from iron—that is to say, can be obtained with only .003 per cent. of iron, or even less. This result is effected by absorbing the sulphuric anhydrid in a fuming sulphuric acid containing about twenty-seven per cent. of free sulphuric

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anhydrid or more—that is, is an acid of minimum strength corresponding to the composition approximately represented by the formula $2\text{H}_2\text{SO}_4 + \text{SO}_2$. This does not dissolve wrought iron and the absorption may be effected in a wrought-iron apparatus that can be kept cool.

PROCESS OF PRODUCING TERPENES AND RESINOUS SUBSTANCES.

George P. Craighill and George A. Kerr, of Lynchburg, Virginia, assignors to N. C. Manson, Jr. Patent No. 800,905, dated October 3, 1905.

In this process the wood after being reduced to chips or shavings is placed in a suitable digester and thoroughly saturated with an alkaline solution of one per cent. The solution dissolves the resinous contents of the wood and opens up the cells thereof, so that upon the application of steam the terpenes are liberated with great freedom and rapidity. The alkaline solution has also the property of fixing the various volatile acids and oils, which would otherwise pass off with the terpenes. For this purpose preferably use a solution of sodium hydroxid, (NaOH), although a solution of sodium carbonate (Na_2CO_3) may be employed. After the wood has been thoroughly saturated with the alkaline solution, steam is admitted to the mass, and in this way the terpenes are volatilized and made to pass off with the steam from the top of the digester. The mass is heated to a temperature of from 100° to 110° C., since any temperature in excess will not result in the production of good turpentine, the best results being secured by subjecting the mass to a low temperature. The acids and oils of the wood being fixed, the volatilized terpenes are recovered from the condenser in a pure and colorless state. They may while volatile be passed through a bone-black filter to secure terpenes of a high grade.

After the steam-supply is discontinued a sufficient quantity of water is added to submerge the wood, and the solution containing the rosin is drawn off. The rosin, free from tarry and oily

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products, is subsequently recovered from this solution, that in suspension by precipitation, and that in solution either by neutralizing the alkali or by evaporation. When the extraction of the wood is effected by destructive distillation or when digested with any strong chemical reagents, the recovered resinous substances are not free from these tarry and oily products.

PROCESS OF NITRATING AROMATIC AMINS.

Wilhelm Herzberg and Eduard Thon, of Berlin, Germany, assignors to Actien Gesellschaft für Anilin Fabrikation. Patent No. 800,913, dated October 3, 1905.

This process consists in heating with diluted nitric acid the so-called "arylsulphamids"—*i.e.*, a sulpho derivative of an aromatic primary or secondary amin. These products are obtained by the reaction of benzene-sulpho-chlorid or para-toluene-sulpho-chlorid upon primary or secondary amins of the benzene series, their derivatives or homologues, so that the simplest form of the products to be nitrated is represented by the formula.



R standing for the hydrogen atom or methyl, ethyl, &c., and R₁ standing for the hydrogen atom or the group CH₃. The nitration of such compounds was hitherto performed in a solution in concentrated acetic acid by the action of concentrated nitric acid. This method is not adapted for industrial purposes because it is a very expensive one and does not yield a uniform product, dinitro derivatives being produced besides mononitro compounds. Also the usual manner of nitration—*i.e.*, by nitrating in concentrated sulphuric acid—is not advantageous, decomposition takes place.

The nitro derivatives obtained according to this process are nearly chemically pure, and therefore immediately fit for use in manufacturing other products—as, for instance, dyestuffs—because only the benzene nucleus annexed to the NH₂ group is attacked by the nitric acid. Moreover, only one nitro group enters this benzene nucleus and takes, in every case, the para

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position to the NH_2 group, so that no waste products occur with our process. The yield, therefore, is a nearly theoretical one.

PROCESS OF MAKING CAMPHOR.

Karl Stephan and Paul Hunsalz, of Berlin, Germany, assignors to Chemische Fabrik auf Actien (vorm. E. Schering). Patent No. 801,483, dated October 10, 1905.

It is known that borneol or isoborneol can be transformed into camphor by such oxidizing agents as chromic acid, permanganate, and the like. All these processes have the drawback that the products formed by the reduction of the oxidizing agent—for example, salts of chromic acid—are mixed with the camphor and render its purification more difficult. Camphor may, however, be obtained without difficulty and without any troublesome admixture when ozone is used as the oxidizing agent. It was by no means obvious that the oxidation could be produced without difficulty by means of ozone. Apart from the fact that by no means all oxidizing agents are successful, the action of manganese and sulfuric acid upon isoborneol, for example, producing mainly aldehydes, it was to be expected that the use of ozone might lead to the formation of additive products which by reason of their tendency to explode would have rendered the process technically impossible. Further, it may be remarked that while other oxidizing agents transform the camphene into camphor the action of ozone upon camphene produces no camphor, but only camphenil and formic aldehyde.

PROCESS OF MAKING CAMPHOR.

Karl Stephan and Paul Rehländer, of Berlin, Germany, assignors to Chemische Fabrik auf Actien, vorm. E. Schering. Patent No. 801,485, dated October 10, 1905.

The inventors have discovered that camphor may be produced by oxidizing borneol or isoborneol by means of oxygen or air with or without the use of so-called "catalytic" reagents.

The process consists in treating borneol or isoborneol vapors

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at a high temperature, 170°-195° C., with oxygen in a pure state or a gas containing oxygen such as air.

PROCESS OF MAKING CAMPHOR.

Lorenz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne. Patent No. 802,792, dated October 24, 1905.

This invention relates to a process of producing camphor from isoborneol.

It has been common heretofore to oxidize isoborneol by means of acid solutions to produce camphor. It has also been proposed to oxidize borneol in an alkaline solution—namely, by acting upon it with a weak solution of permanganate in water. These methods, however, do not lead to a ready production of camphor. It is now found that the conversion of isoborneol to camphor can be done very easily and rapidly by the action of chlorin upon the isoborneol. In employing chlorin it may be used either in the gaseous state or in solution—for example, in water, carbontetrachlorid, chloroform. Upon leading chlorin gas over finely-powdered isoborneol a reaction takes place, the mass becoming warmer and hydrochloric acid being evolved. In order to moderate the reaction, the chlorin may be diluted with any suitable indifferent or inert gas—for example, air, carbonic acid—care being taken that the reaction proceeds in a moderate manner by exterior cooling, preferably to a temperature of about 30° C., and by a thorough mixing or stirring of the mass. The isoborneol instead of being used in a pulverized condition may also be employed in solution in any suitable medium—as, for example, benzene or chloroform. When working in aqueous solution, one can employ either the calculated amount of saturated chlorin water or a smaller quantity of water wherein the requisite weight of chlorin gas is gradually passed.

PROCESS OF MAKING CAMPHOR.

Lorenz Ach, of Mannheim, Germany, assignor to C. F. Boehringer & Soehne. Patent No. 802,793, dated October 24, 1905.

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On passing so-called "gaseous nitrous acid" over isoborneol the former is rapidly absorbed, heat is liberated and the isoborneol gradually deliquesces. A mobile liquid is formed, which gradually becomes clouded by separation of water. On saturating the well-cooled liquid with the gas until a bluish-green coloration is attained and letting the liquid stand for a time a rise of temperature takes place and nitrous fumes are evolved. The product thus obtained consists of two liquid layers, of which the upper is a clear slightly-colored oil, the lower one consisting of a comparatively small quantity of aqueous fluid. The oil possesses the property of solidifying to a mass of crystalline camphor on mixing with water. The same reaction takes place when nitrous gases are passed over borneol. On this property of the two borneols is founded the process for the preparation of camphor from these materials. Its advantage consists in the fact that by it a good yield of camphor is attained, the same being pure and free from by-products. The amount of nitrous acid consumed during the process is comparatively small, inasmuch as the gases which escape from the liquid react with the atmospheric oxygen, regenerating nitrous acids, which may be reintroduced into the process. Instead of solid borneols a suitable solution of the same can be used employing as solvents—chloroform, ligroine, or ether.

PROCESS OF MAKING AMMONIA BY SYNTHESIS.

Herman Charles Woltereck, of Westminster, London, England, assignor to the Eschweiler-Woltereck Process Syndicate, Limited, of London, England. Patent No. 803,651, dated November 7, 1905.

This invention relates to the production of ammonia by synthesis, and has for its object to render the product cheaper and to increase the available supply.

The process consists in passing a mixture of air and a gas-containing hydrogen—such as coal-gas or water-gas—in about equal quantities and saturated with steam over iron oxid heated to a dull-red heat or other metallic oxid adapted to act as a

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carrier of oxygen. The oxid is advantageously disposed in such a manner as to offer the most intimate contact and largest surface to the mixture of gases employed. When coal-gas is employed, a quantity of organic amins is produced which may be destroyed to liberate the ammonia by passing the gases through boiling caustic solutions or over heated lime before absorbing the ammonia in acid in the ordinary manner.

PROCESS OF MAKING AMMONIA BY SYNTHESIS.

Herman Charles Woltereck, of London, England, assignor to the Chemicals Proprietary Company, Limited, of London. Patent No. 803,652, dated November 7, 1905.

This is an elaboration of the process described in U. S. Patent No. 803,651. It is now found that if air and steam only heated to a temperature between 300° and 400° C., and preferably to 350° C., are passed over iron (or other suitable element) offering a large surface and intimate contact ammonia is formed in considerable quantities, while the iron, &c., is oxidized. It is preferable that the iron or other contact material should also be heated to the temperature required to prevent loss of action by cooling. The formation of ammonia decreases with the progress of the oxidation of the contact material; but it is possible to hold the oxidation in check by the admixture of a small quantity of a reducing-gas, such as carbon monoxid or hydrogen or of gases containing either or both of same, to the air and steam used, and to thus insure the continuity of the process. The gases may be mixed prior to their entering the reaction tube or chamber containing the iron, (or other suitable metal,) or they may be separately introduced and allowed to mix in the reaction tube or chamber itself. The air and reducing-gas may be first passed and the steam afterward over the iron or other suitable metal. Any oxygen-carrier metal is a suitable metal, and although iron has yielded the best results almost as good results are obtained with bismuth and chromium.

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PROCESS OF MAKING AMMONIA BY SYNTHESIS.

Herman Charles Woltereck, of London, England, assignor to the Chemicals Proprietary Company, Limited, of London. Patent No. 803,653, dated November 7, 1905.

This process is based on that described in U. S. Patent No. 803,651.

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PROCESS OF MAKING HYDROSULPHITE PREPARATIONS.

Rudolf Müller, of Höchst-on-the-Rhine, Germany, assignor to Farbwerke vorm. Meister, Lucius & Brünning. Patent No. 804,157, dated November 7, 1905.

The inventor has found that alkali hydrosulphite may be combined with acetone, but that stable preparations may be obtained

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only if the hydrosulphites are brought together with ketones, such as dimethyl and ethylmethylketone, in presence of alkali and preferably simultaneously with ammonia. The solutions thus obtained may be concentrated in a vacuum at a low temperature, whereby products are obtained which are stable for a considerable time. They may be usefully employed for discharging purposes, such as the discharge of naphthylamin-bordeaux.

PROCESS OF MAKING AND SEPARATING HYDROCHLORIC AND SULPHURIC ACIDS.

Paul Askenasy and Martin Mugdan, of Nuremberg, Germany.
Patent No. 804,515, dated November 29, 1905.

It is known that the reaction of chlorin and sulphurous acid in water results in the formation of hydrochloric and sulphuric acids.

The production and separation of hydrochloric acid and sulphuric acid by utilizing this reaction are carried out in the following manner: In a suitable chamber or tower which is preferably filled with stones and in which pure or diluted sulphurous acid (pyritic gases) and chlorine are introduced at the bottom, only so much water is introduced from above as corresponds with the quantity of gaseous hydrochloric acid and concentrated (sixty-five to eighty per cent.) sulphuric acid produced. The reaction continues until the remainder of the gases is consumed, when the reaction substances are allowed to act upon each other for a sufficient length of time, which can be attained by varying the proportions of the reaction-chamber according to requirement. At the commencement of the process a violent reaction takes place at the point where the gases come into contact with the current of liquid, which produces a mixture of aqueous hydrochloric acid and sulphuric acid. This mixture sinks in the reaction-chamber and comes into contact with fresh quantities of the gas mixture, thus forming fresh quantities of acid until finally a saturated solution of hydrochloric and sulphuric acid is formed. As soon as this point has been attained the sulphuric acid then formed by the

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continued reaction of the gas and liquid drives off the hydrochloric acid from the acid mixture in such a manner that sulphuric acid becoming more concentrated and poorer in hydrochloric acid sinks to the bottom and may be carried off in an entirely pure state at F, while the hydrochloric acid completely escapes at the top in the form of gas. This hydrochloric acid will not be absorbed, because during its passage up to a certain height of the tower it will only come into contact with mixtures which are saturated with hydrochloric acid, and is disposed of in a suitable manner.

PROCESS OF MAKING ACETYLENE TETRACHLORID.

Paul Askenasy and Martin Mugdan, of Nuremberg, Germany.
Patent No. 804,516, dated November 14, 1905.

The process forming the object of the present invention enables the cheap and convenient production of acetylene tetrachlorid without danger and with a very slight loss of the intermediate substance.

Acetylene is fed into pentachlorid of antimony which should advantageously contain no free chlorin. The pentachlorid of antimony which may be diluted with a suitable medium, such as tetrachlorid and acetylene, will absorb two molecules of gas.

Chlorin is then led into the product obtained from pentachlorid of antimony and acetylene, four atoms of the chlorin being bound by each molecule of acetylene present, tetrachlorid of acetylene being formed and pentachlorid of antimony being re-formed. Acetylene is then fed into the same fluid, and then again chlorin, and so on alternately until, finally, if sufficient chlorin is fed, a mixture of pentachlorid of antimony, tetrachlorid of acetylene, and small quantities of the products of substitution of the latter body is obtained. If the pentachlorid of antimony is diluted to a very great extent by the tetrachlorid of acetylene produced, the

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reactions will still take place with sufficient speed for economical purposes.

In order to isolate the tetrachlorid of acetylene, the pentachlorid of antimony may be decomposed—for instance, by means of hydrochloric acid. It is, however, advantageous to subject the product of the reaction to a slow fractionated distillation, in which case the pentachlorid of antimony changes to trichlorid of antimony by splitting off the chlorine for the most part, partly as escaping gas, partly by chlorinating the tetrachlorid of acetylene to penta or hexa chloroethane. The trichlorid of antimony, which has a very high boiling-point, (220°,) may be easily separated from the tetrachlorid of acetylene, which boils at 146°.

PROCESS OF MAKING PROTOCATECHUIC ALDEHYDE.

Rudolf Johann Maria Sommer, of Vienna, Austria-Hungary, assignor to the firm of Franz Fritzsche & Co. Patent No. 804,682, dated November 14, 1905.

This invention relates to the manufacture of protocatechuic aldehyde intended to be used as raw material in the manufacture of vanillin and other chemicals.

According to a scientific publication heliotropin with hydrochloric acid of one per cent. gives when heated to a temperature of 200° C. protocatechuic aldehyde, carbon being at the same time separated. At a pressure of fourteen atmospheres—that is to say, at a temperature of about 195° to 200° C.—heliotropin begins to be carbonized; but nevertheless no extraction of protocatechuic aldehyde on a large scale is possible, only traces of it unfit for any technical purpose being obtained. It has been found that dilute acids, which, however, can be replaced by solutions of acid salts, such as bisulfates, bisulfites, or chlorids of metals, at twelve atmospheres—that is to say, at about 185° to 190° C.—and at a lower pressure or temperature easily produce the decomposition of heliotropin into protocatechuic aldehyde, so that nearly the whole theoretical yield is obtained.

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PROCESS OF MAKING HYDROCHLORIC ACID.

Willis Eugene Everette, of Tacoma, Washington. Patent No. 805,009, dated November 21, 1905.

The claims cover—

1. A process of producing hydrochloric acid, which consists, first: in reducing a mixture of water, chlorin gas and compressed air to an intense crymic condition by contact with liquid air; second: subjecting said mixture while still in said intense crymic condition, to contact with intense heat by impact against incandescent silica, whereby the nitrogen and oxygen are liberated, while the chlorin combines with a portion of the liberated hydrogen to form hydrochloric-acid gas; third: dissolving said gas in water thereby forming hydrochloric acid, and collecting the same for commercial use.

2. A process of producing hydrochloric acid which consists first: in reducing a mixture of water, chlorin gas, compressed air and chlorid of an alkali to an intense crymic condition with liquid air; second: subjecting said mixture, while still in said intense crymic condition, to contact with intense heat by impact against incandescent silica, whereby a disruption of said substances is caused; third: collecting a portion of said substances recombined with the aid of water as hydrochloric acid.

PROCESS OF RECOVERING AMMONIA AND HYDRO-CYANIC ACID.

Walther Feld, of Hönningen-on-the-Rhine, Germany. Patent No. 806,467, dated December 5, 1905.

This process, according to this invention, has for its object to enable practically the whole quantity of ammonia and of hydro-cyanic acid present in the gases to be recovered in one operation and to avoid the formation of sulphocyanids by neutralizing the whole of the free ammonia and the basic ammonia compounds and forming neutral ammonia salts immediately the gas comes into contact with the absorbing means and by absorbing the whole

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of the hydrocyanic acid in the same solution, forming an iron-cyanogen compound. For this purpose the gases are treated with a liquid containing an iron compound or compounds, (especially ferrous compounds,) together with salts, as hereinafter explained, in such proportions that for each six molecules of cyanogen in the gas at least one atom of iron is used and that for each molecule of ammonia in the gas there is used at least one non-atomic equivalent of a salt which will be decomposed by free ammonia alone or by ammonia in the presence of carbonic acid, sulfureted hydrogen, or hydrocyanic acid, in yielding the corresponding neutral ammonia salt and the basic compound of the metal of the salt used. These salts are the acid and neutral salts of non-basic reaction of the alkalies, earth alkalies, and magnesia, and of those metallic earths and metals which are decomposed by basic ammonia compounds (ammonium hydroxid, ammonium carbonate, sulphide, and cyanid).

PROCESS OF MAKING CONCENTRATED FORMIC ACID.

Max Hamel, of Grünau, near Berlin, Germany. Patent No. 806,660, dated December 5, 1905.

The inventor claims that formic acid of any desired high concentration up to the so-called "anhydrous" state can be produced from formiates directly by a single distillation without fear of any decomposition of any kind if the formiate is dissolved in a solvent before treatment with concentrated sulphuric acid. The solvent should be free from water or contain water only in proportion corresponding to the desired degree of concentration of the formic acid to be obtained. By employing such a solvent all sulphuric acid is immediately combined with the base of the formiate without forming lumps or the like and effecting the thickening of the mass, so that the mass can be easily stirred, and therefore a rise of temperature can be easily removed by cooling. As solvent for the formiate there may be employed mainly highly-concentrated or anhydrous formic acid itself; but also other

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solvents may be employed which have another boiling-point and can be sufficiently separated by distillation from the formic acid by keeping the correct temperature or which solvents remaining in the concentrated formic acid do not by their presence injure the practical or technical employment of the latter.

PROCESS OF MAKING ORGANIC-ACID ANHYDRIDS.

Rudolf Sommer, of Vienna, Austria-Hungary. Patent No. 806,932, dated December 12, 1905.

According to this invention the acids are transformed into their anhydrids by acting upon the heated dehydrated salts of the acids with tetrafluorid of silicon. It is found that by the employment of this substance, which is of low cost and easily obtainable, the anhydrids are produced with facility. It is also found that tetrafluorid is yielded from the residue obtained on the distillation of the anhydrids by treating it with sulfuric acid with the addition of some sand.

MANUFACTURE OF SUGAR FROM CELLULOSE.

Charles Frederick Cross, of London, England. Patent No. 807,250, dated December 12, 1905.

The claims cover—

1. A process for the manufacture of a crystalline sugar from cotton-seed hulls, consisting in treating the hulls to isolate the cellulose, separating the cellulose into longer fibres and shorter fibres, hydrolyzing the said shorter fibres and crystallizing the product of hydrolysis.

2. A process for the manufacture of a crystalline sugar, consisting in subjecting cotton-seed hulls successively to the action of first an alkaline solution, second chlorin and third an alkaline solution, then separating the longer from the shorter fibres, and finally hydrolyzing the shorter fibres.

3. A process for the manufacture of a crystalline sugar, consisting in subjecting cotton-seed hulls successively to the action of first an alkaline solution, second chlorin and third an alkaline

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solution, then breaking up the mass of cellulose produced, then suspending the broken mass in water, then collecting the portion which settles first and finally hydrolyzing this portion.

PROCESS OF BROMINATING INDIGO.

Albrecht Schmidt, of Höchst-on-the-Main, Germany, assignor to Farbwerke, vorm. Meister, Lucius & Brüning. Patent No. 807,782, dated December 19, 1905.

Contrary to previous experience, the inventor has found that indigo may be brominated in the presence of water if the action of bromin on indigo occurs in the presence of inorganic acids—especially, for instance, with sulphuric, hydrochloric, hydrobromic, or fluoric acids. The quantity and strength of these acids, however, has to be controlled to avoid as much as possible any formation of bromo-isatin. By employing certain concentrations varying according to the choice of the inorganic acids the bromination will occur smoothly—that is, without or with hardly any formation of bromo-isatin. If a lower degree of concentration is used, the yield of bromo-indigo decreases, whereas the bromo-isatin increases. In the case of hydrobromic acid instead of adding it at the beginning it may also be allowed to form during the process of substitution by brominating indigo in water. Of course it is necessary here to use only little water—for instance, instead of an indigo paste of twenty-per-cent. strength indigo moistened only with twenty to fifty per cent. of water—for otherwise the hydrogen bromid formed during the process of substitution would not suffice to produce at the beginning the more concentrated hydrobromic acid favorable for bromination. The same holds good if dilute inorganic acids are used, which when employed in great quantities do not produce a favorable result of bromination; but when used, as in the case with little water, preferably in the presence of solid or liquid indifferent diluents, a very good product of bromination may yet be arrived at.

According to the quantity of bromin employed more or less highly brominated products may be obtained.

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MACHINES.

APPARATUS FOR DRYING YARN.

Abraham Hun Berry, of Waltham, and Ervine C. Woodward, of Medford, Massachusetts. Patent No. 779,759, dated January 10, 1905.

This apparatus practically consists of two parallel chambers placed side by side closed to the outer air and having a third chamber connected with both. The latter has a ventilating fan placed in an opening into one of the parallel chambers and a suitable heater in the opening into the other chamber. By means of this fan and heater a constant circulation of warm air is kept up in the parallel chambers or boxes which contain the yarn. This temperature can be regulated at will so that all danger of overheating is avoided.

DYEING-MACHINE.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company, of Chattanooga, Tennessee. Patent No. 780,398, dated January 17, 1905.

This machine consists of a dye-vat of any suitable form having mounted in the center a cylinder suitable for use as an overflow for the dye or wash liquor so the liquor can be withdrawn from the vat and applied again to the material. The circulation is kept up by means of a rotary pump whose suction pipe is connected with the cylinder and the outlet with suitable pipes in the bottom of the dye-vat.

The claims cover the details of construction.

APPARATUS FOR DYEING.

James A. Willard, of Chattanooga, Tennessee. Patent No. 780,399, dated January 17, 1905.

The invention aims to provide in a dyeing-machine new and

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novel means, in the form of a centrifugal pump, for obtaining a more satisfactory circulation of the dyeing or washing medium through the material operated upon during the dyeing or washing operation.

The invention further consists of the novel construction of the dye liquor and material-receiving tank or vat and which is a sectional one, so that the height thereof can be diminished or increased, as occasion requires, and it will furthermore permit of the more easy handling when setting up or shipping the vat or tank, owing to its sectional construction.

The claims cover the details of construction.

COMPRESSION-TOP FOR DYE-VATS.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 780,400, dated January 17, 1905.

This invention relates to new and useful improvements in compression top or closure plates for dyeing apparatus, and has for its object the construction of a plate of this character which when placed in position in a dyeing apparatus will not bend or buckle from pressure during the dyeing or washing operation.

A further object of the invention is to provide a plate which can be easily and quickly removed from the machine.

The claims cover the details of construction.

VAT FOR DYEING, &c.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 780,402, dated January 17, 1905.

This invention relates to vats particularly adapted for dyeing and bleaching, and aims to construct a vat for such purpose which shall be simple in its construction, strong, durable, and efficient in its use, and comparatively inexpensive to manufacture.

A vat constructed in accordance with this invention for bleaching or dyeing purposes involves a receptacle, a perforated re-

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movable bottom plate which forms a supplemental bottom for the receptacle and upon which the material to be treated is placed, a compression top or cover plate for the receptacle, means for retaining the cover-plate in position, and a casing connected with the receptacle, near the top thereof, to form an overflow-chamber for the dyeing or bleaching medium.

APPARATUS FOR DRYING WOVEN GOODS.

Moritz Rudolf Jahr, of Gera, Germany. Patent No. 781,145, dated January 31, 1905.

Hitherto methods and apparatus for drying woven goods and the like generally had the disadvantage that the woven goods from the beginning to the end were subjected to the influence of dry heat uniformly high, whereby the "touch" and smoothness of the material is very much impaired, while at the same time this dry hot air has an injurious effect on dyed material and sometimes also gives it a faded appearance. These disadvantages are avoided according to the present invention, which consists of a method and apparatus for the drying of woven goods and the like wherein the woven goods are led through passages lying one above the other and through which the dry air passes in such a manner that the goods at their entrance into the drying-machine are at once subjected to the action of dry air of very high temperature, which is reduced till in the last stage it is lowered to the ordinary temperature. This is effected by the hot air entering the channel at the bottom of the drying-machine passing through movable flaps in certain volumes into the channels, where its temperature is regulated by means of fresh air and brought to the desired degree. The volume of fresh air which enters and regulates the heat is also adjusted by means of flaps or slides.

APPARATUS FOR DYEING.

Léon Détré, of Rheims, France. Patent No. 782,008, dated February 7, 1905.

This invention provides in an apparatus for dyeing under

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pressure, means for the introduction of the dyes or mordants into the apparatus while the apparatus is at work and while the pressure remains in the various vessels composing the apparatus.

The most recent design of apparatus for dyeing under pressure comprises two vessels, containing the dyestuff, and another other vessel or other vessels, containing the articles or material to be dyed. Compressed air or any other suitable fluid pressure is admitted alternately to each of the two vessels containing the dye, so as to force the dye from one vessel into the vessel containing the articles or materials to be dyed, and from the said vessels into the second vessel. Then by means of a cock the pressure is disconnected from the first vessel and admitted to the second vessel, thereby forcing the dye from the vessel into the vessel with the material and back into the first vessel. The cock for reversing the direction of the pressure is a four-way cock, which is worked automatically, so as to cause the air or other pressure to act alternately in each of the two vessels, the other vessel communicating with the atmosphere.

The device constituting this invention consists in the addition to the apparatus just described of a closed vessel into which the dyestuff to replenish the vessels is introduced by means of a funnel provided with a cock. Two pipes connect this vessel with the top of the vessels for the dye-bath, the said pipe passing through hermetically-tight joints provided in the cover of the vessel and extending nearly to the bottom thereof. These pipes are provided with cocks, permitting of opening or closing it at will.

DYEING-MACHINE.

Julius Leisel, of Charlotte, North Carolina. Patent No. 782,147, dated February 7, 1905.

The object of the invention is to provide a new and improved dyeing-machine arranged to keep the material submerged, to prevent the material from coming in contact with the air during the dyeing operation, to carry on the dyeing operation economically both in time and labor, to expedite unloading of the machine after

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the material is dyed and to remove foreign and insoluble matter from the dyeing liquor during the process of dyeing, to facilitate the circulation of the dyeing liquor through the material, and to prevent uneven and spotted shades in the dyed material.

The claims cover the details of construction.

MERCERIZING APPARATUS.

Paul Edlich, of Triebes, Germany. Patent No. 783,569, dated February 28, 1905.

This invention relates to an apparatus for mercerizing cotton fabric wherein the fabric is passed uninterruptedly through the initial tension-machine, then through the proper mercerizing device, and then through the final tension-machine. While with the known machines relating to this art the fabric as soon as it leaves the initial tension-machine has to be transported by hand to the mercerizing device proper and after going through the same has to be transported by hand to the final tension-machine, the present invention provides for a continuous treatment of the fabric in these several apparatus, which have been combined in one mechanical combination.

DYEING APPARATUS.

Daniel F. Waters, of Philadelphia, Pennsylvania. Patent No. 785,283, dated March 21, 1905.

This invention relates particularly to certain improvements in the frame upon which the yarn is suspended over an open rectangular kettle and means to move the yarn-sticks to progress the yarn hung thereon.

These improvements comprise means to intermittently rotate the yarn-sticks, including ratchet-wheels on the respective sticks, pawls engaged with said wheels, a bar common to said pawls, and means arranged to reciprocate said bar in definite relation to the movement of a liquor-circulating wheel.

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It also includes yarn-sticks of polygonal cross-section having recesses between their angles, permitting access of the liquor between the sticks and the yarn thereon, and an improved liquor-circulating wheel mounted upon a horizontal axis and having a plurality of blades extending parallel with said axis.

WARP-DYEING MACHINE.

Theodore E. Davis, of Winston Salem, North Carolina. Patent No. 785,597, dated March 21, 1905.

The object of the invention is to provide a machine for dyeing warp which is so constructed as to permit of dyeing a large amount of warp at one time, to reduce the tension on the warp to a minimum, to prevent tension on the warp during the dyeing operation, to obtain the necessary oxidation of the warp during the dyeing operation, to keep the dye-bath at a regular temperature throughout the run, and to produce even shades in the finished product, thereby overcoming the great difficulty in matching one warp with another.

The invention further aims to construct a machine for dyeing warp various colors, as sulphur-blacks, cutch-brown, anilin-blues, &c., and which shall be simple in construction, strong, durable, and efficient in its use.

DYEING-MACHINE.

Max Sarfert, of Philadelphia, Pennsylvania. Patent No. 786,162, dated March 28, 1905.

This invention consists of an improved construction of a dyeing and saturating machine embodying a rotatable tub or trough, which is adapted to coact with rollers mounted upon a shaft and supported so as to be capable of upward movement, if desired, said trough being supported upon suitable antifricition devices and rotated in any convenient manner.

The claims cover the details of construction.

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MERCERIZING-MACHINE.

Harry W. Butterworth, of Philadelphia, Pennsylvania, assignor to the H. W. Butterworth and Sons Company. Patent No. 786,264, dated April 4, 1905.

The object of this invention is to construct a mercerizing-machine which shall subject a continuous web of fabric to the action of the mercerizing fluid (usually caustic soda) in such a manner that it shall subject said fabric to the action of the caustic alkali while maintaining it in a positively-stretched and nonshrinkable condition and while being also subjected to a succession of squeezing or pressure actions, whereby the mercerizing fluid is positively forced through the woven fabric to uniformly impregnate it.

The claims cover the details of construction.

SKEIN-DYEING MACHINE.

William H. Fletcher, of Paterson, New Jersey. Patent No. 787,285, dated April 11, 1905.

This machine consists of an ordinary yarn kettle with an endless chain carrying suitable yarn-sticks running above it. By an arrangement of reels the skeins are transposed from one end of the kettle to the other, being also kept constantly in motion from end to end by the rotation of the yarn holders.

The claims cover the details of construction.

APPARATUS FOR PRINTING WARPS ON PRINTING-DRUMS.

Franz Schmidt, of Oberschöneweide, Germany. Patent No. 789,068, dated May 2, 1905.

The present invention relates to an apparatus for printing warps on printing-drums, wherein the adjustment of the printing-drum is effected in such a manner that its movement is dependent upon the movement of the adjusting device for the design. Hence there exists such a relationship between the adjusting device, con-

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sisting, for instance, of an indicating device and a pattern-carrier, and the printing-drum that owing to the relative movement occurring between the indicator and pattern-carrier a movement and adjustment of the printing-drum is effected. The inducement for the movement of the printing-drum can at the same time be given by the pattern-carrier or by the indicating device, or by both simultaneously. In order to obtain a sharp coincidence between the movement of the adjusting device and the movement of the printing-drum and to admit of the use of transmitting mechanism of the simplest kind, the pattern is directly connected to the printing-drum, so that on adjusting the design on the indicating apparatus the adjusting of the printing-drum is automatically effected. The driving mechanism will be all the more simple if a uniform movement be had between the pattern-carrier and the printing-drum—i.e., by also forming the pattern-carrier as a drum. It is, furthermore, important that there be mounted between the pattern-carrier and the printing or warp drum interchangeable or adjustable driving-mechanism transmissions.

DOUBLE PRINTING-DRUM FOR WARPS.

Franz Schmidt, of Oberschöneweide, Germany. Patent No. 789,069, dated May 2, 1905.

The subject-matter of the present invention is a double printing-drum for warps, consisting of two drums of different circumference which can simultaneously be printed with the same pattern, as both drums receive the same angular rotation. This uniform angular rotation is obtained by the intercalation of gearing. It is furthermore essential that the two warp-drums of different circumference be driven together with a drum containing the design or pattern, the driving thereof being effected in that driving-crowns are provided on the circumference of the drums. By means of this arrangement a pattern from the same design is simultaneously printed upon different lengths of warp and when working with one upon the other the same number of printed strips is printed off and, viz., corresponding to the circumfer-

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ences, upon the larger drum printed strips of greater breadth and on the smaller drum printed strips of smaller width, the advantage being obtained that the patterns upon both drums are entirely the same under all circumstances. The new apparatus can, for instance, be used for simultaneously producing the warps for the seats and pockets used in covering sofas. These were formerly made separately on different machines, the drawback in printing them in this way being that owing to mistakes confusion occurred between the patterns of the seat-warps and of the pocket-warps. This drawback is prevented by the compulsory connection of the two drums of different circumference to each other. Furthermore, the advantage is obtained that the two patterns of different size can be made with a great saving of time and labor. Whereas formerly two persons were required for serving two machines, one hand only is required for the new apparatus. By the use of the pattern-drum common to both drums the advantage is furthermore obtained of rapid adjustment and a further economy of time and labor. As the design is already printed upon the pattern-drum or the like, all the operative has to do is to move this drum and no longer needs to read off figures from the design (pattern) and edge of the printing-drum prior to making the adjustment.

MACHINE FOR MERCERIZING, &c.

William Henry Crompton and William Horrocks, of Radcliffe, England. Patent No. 789,260, dated May 9, 1905.

This invention relates particularly to improvements in the type of machines for mercerizing, scouring, bleaching, dyeing, washing, and like treatment of yarn in hank form described in U. S. Patent No. 680,131, and in which the hank-reels are mounted in frames employed in a tank and are carried by the hanks and the latter thereby subjected to the whole weight of the said frames, which improvements may, however, also be used in connection with hank-reels mounted in any other suitable manner. In the said type of machines it is necessary to lift the said hank-frames out of the tank for the purpose of draining the hanks previous to further

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treatment with liquor in another machine, and the liquor-tank forms one continuous receptacle, and thus does not allow of building the machine in sections—that is to say, increase its capacity by degrees and facilitate transport.

The object of the present invention is chiefly to provide means whereby the said defects are overcome and also the quantity of liquor required for the treatment of the hanks is greatly reduced.

APPARATUS FOR DYEING SLIVERS.

Charles M. Hanson, of Peacedale, Rhode Island. Patent No. 791,148, dated May 30, 1905.

This invention relates particularly to the lower part of the apparatus, described in U. S. Patent No. 708,808, and the method of conducting the dyeing liquor to the stock to be dyed, the upper part of the apparatus being substantially the same as in the said patented apparatus, for a detailed description of which reference is made to said patent.

My improvement consists in arranging a hood over the central bottom opening of the inclined floor of the apparatus, having a packing-ring on the bottom edge thereof between said hood and floor and a series of liquor-conducting pipes, connected with the crown of said hood about equidistant apart around the central vertical drive-shaft, which passes down through the hood. The pipes extend up and out radially from the crown of the hood to the bottom inner edge of the usual perforated cans and from said point each pipe has two branches, one branch extending up vertically next to the inner side of its respective perforated can and another extending horizontally to under the center of said can and connected with the bottom of the usual vertical perforated tube, which extends up through the center of the can. The branch pipes are each perforated the whole length of the inner sides next to the cans for the purpose of discharging the dyeing liquor against the perforated surfaces of the cans, which being rotated slowly independent of the high speed imparted to the operating parts of the apparatus, as described in the patent previously referred to, causes

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the liquor to enter the cans and pass through the stock contained therein, the centrifugal force caused by said high rate of speed causing the liquor to percolate thoroughly through every part of said stock, and thus evenly dyes the same throughout its entire body.

DYEING-MACHINE.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 793,488, dated June 27, 1905.

The machine described in this invention is constructed to dye, wash, and fix the dyestuffs upon the material being operated on while it is submerged at all times without coming in contact with the air and until the color has been set and made fast or permanent.

It aims to provide a dyeing-machine with new and novel means for removing the dyed or washed material from the vat in which the material was operated upon.

The invention further aims to construct a machine for dyeing raw stock, wool, and similar material which is so constructed that after the material has been compressed so as to be operated upon it will be securely held in its compressed condition.

The claim covers a dyeing-machine involving a vat, a removable perforated top plate for said vat, a vertically-movable perforated supported plate operated in said vat and adapted to support the material to be operated upon, means communicating with said vat for circulating dye liquor therethrough, a lifting-rod for vertically moving the supporting-plate, a lever connected with said rod for reciprocating it, and means connected with the lever for actuating it.

MACHINE FOR DYEING, &c.

Stuart W. Cramer, of Charlotte, North Carolina. Patent No. 793,510, dated June 27, 1905.

This invention relates to the treatment of textile fibres and

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fabrics by dyeing, bleaching, washing, or cleansing and the removal of the water or the liquid therefrom either at intervals during the process or at its conclusion.

The purpose of this invention is to accomplish any or all of these results in one single machine, which therefore performs the functions of a combined dyer and centrifugal machine, thereby condensing into one machine the operations usually performed in two separate machines, with the attendant economy in both time and labor. It is believed that better results will be obtained where the several operations are carried on in one single machine than when divided into two separate machines, because of the element of quickness and celerity of operation that is thereby possible, for in many cases these operations should follow each other with the least possible interval between them to insure the best results.

This is a centrifugal type of machine providing that the various operations of dyeing, washing, and hydroextracting may be done in one machine without handling the material during the intermediate processes.

The claims cover the details of construction.

DYEING APPARATUS.

Otto Kunz, of Vienna, Austria-Hungary. Patent No. 793,594, dated June 27, 1905.

This invention relates to improved apparatus for dyeing textile fibres, and more particularly silk yarns, of that type in which the skeins hang from rollers which rotate with alternating motion.

The essential feature of the invention is the arrangement of laterally-swinging rods or bars which enter the skeins and prevent the threads becoming entangled no matter how close they may lie together and which, furthermore, cause a swinging motion of the skeins in the dye-bath. In this manner every thread will be thoroughly saturated with liquor. A special device is also provided for enabling the dyed skeins to be readily lifted out and new ones inserted.

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ROTARY OXIDIZING APPARATUS.

Alexander N. Dubois, of Philadelphia, Pennsylvania. Patent No. 794,085, dated July 4, 1905.

This invention relates to improvements in rotary oxidizing apparatus for the use of dyers.

The object of the invention is to improve the construction of apparatus shown and described in U. S. Patent No. 676,647, by providing means whereby the goods contained in the oxidizing-cylinders will be prevented from being thrown and piled up in one end of the cylinders, thereby retarding and prolonging the oxidizing of the same.

With this object in view the invention consists in the construction and arrangement of certain of the parts.

DYEING-MACHINE.

Robert P. Smith, of Philadelphia, Pennsylvania, assignor of one-half to George E. Drum, of Philadelphia, Pennsylvania. Patent No. 794,560, dated July 11, 1905.

The machine described in this invention may be said broadly to consist of a suitable tank adapted to contain the dyeing solution, and a suitable receptacle to contain the articles to be dyed and adapted to be introduced into or removed from the tank. This tank may be of any shape and size for its intended purpose. In the present instance it comprises a body portion semicircular in cross-section, and with the end walls, closing the ends of the semicircular body portion and forming suitable supports for the tank. The receptacle is preferably of the same general shape as the interior of the tank, but slightly smaller in dimensions, to the end that it may be readily introduced into or removed from the tank as desired. The top of the receptacle is open, and it is provided with a hinged bottom, pivoted, and held in place by a suitable bolt. The bottom of the receptacle is provided with perforations for the admission of the dyeing-solution when the receptacle is introduced into the tank.

The claims cover the details of construction.

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CONTINUOUS BLEACHING APPARATUS.

Manuel Muntadas Y Rovira, of Barcelona, Spain. Patent No. 796,345, dated August 1, 1905.

This invention relates to improvements in continuous bleaching apparatus, and is a specific improvement on the apparatus described in a former patent, No. 761,107.

The invention relates to an apparatus forming a series of treating-chambers wherein the fabric is accumulated while being subjected to a lixiviation in each chamber, and these chambers are so disposed that the lye acts therein in a methodical order, said chambers being also subjected to a different pressure generally increasing from one another. The fabric is caused to pass through the lye before entering the corresponding chamber, and after a first lixiviation it is washed out with water, said washing-water being separated or conveyed out of the chamber. After the second lixiviation the fabric passes between a couple of cleansing-rollers, and after the last lixiviation it is subjected to a methodical washing, the pressure gradually increasing from the ends to the center of the apparatus.

The claims cover the details of construction.

APPARATUS FOR DYEING.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 796,381, dated August 1, 1905.

This invention relates to certain new and useful improvements in apparatus for dyeing raw stock—wool and similar materials—particularly improvements upon Patents No. 715,719, December 9, 1902; No. 723,795, March 24, 1903; No. 744,147, November 17, 1903, and application Serial No. 179,848, filed November 4, 1903.

The object of the invention is to construct an apparatus which is particularly adapted for dyeing, washing, and fixing dyestuffs upon the material being operated on while it is submerged at all times without the material coming in contact with air until the

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color has been set and made fast or permanent, and, furthermore, so constructed as to permit of readily removing from the apparatus the material after it has been treated, and, furthermore, to permit of transporting the treated material to any point desired.

One of the essential features of the invention is to construct the apparatus without the employment of a vertically-extending rod arranged centrally of an outer receptacle for the dye liquor and extending through a removable perforated bottom plate and a removable perforated compression-plate, the structure just referred to forming a part of the subject-matter of the patents hereinbefore noted, as well as the pending application, hereinbefore noted. It has been found that the employment of this central rod prevents the removal of the treated material, as said material is liable to twist around the rod and retard the removal of the material, as well as the removable bottom plate upon which the material is compressed and supported within the apparatus.

Another of the improvements upon the structures disclosed by the patents hereinbefore noted, as well as said pending application, hereinbefore noted, lies in the manner of retaining the compression-plate within the apparatus during the operation of dyeing or washing.

DUPLEX DYEING-MACHINE.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 796,382, dated August 1, 1905.

This invention relates to duplex dyeing-machines adapted for the dyeing of raw stock, wool, and similar materials in bulk; and the object thereof is to provide a duplex dyeing-machine whereby the dyeing of one lot of material can be done while another mass which has been dyed is removed from the machine and a new portion to be treated substituted, thereby increasing the output of the dyed material in a given length of time than if the machine was so constructed as to permit of operating upon but one lot of material.

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The machine is particularly adapted for dyeing, washing, and fixing dyestuffs upon the material being operated on while said material is submerged at all times, consequently preventing the material coming in contact with air until the color has been set or made fast or permanent, or, in other words, preventing oxidation while the material is being treated.

DYEING-MACHINE.

James A. Willard, of Chattanooga, Tennessee, assignor to Vacuum Dyeing Machine Company. Patent No. 796,383, dated August 1, 1905.

The object of the invention is to construct an apparatus or machine which is particularly adapted for dyeing, washing, and fixing dyestuffs upon the material being operated on, while it is submerged, at all times and without the material coming in contact with air until the color has been set and made fast or permanent; furthermore, so constructed as to permit of readily removing from the machine the material after it has been treated and to permit of transporting the treated material to any point desired.

It further aims to provide a dyeing-machine with means to prevent the exit from the machine of dirt, trash, or other matters during the circulation of the dyeing medium—that is to say, to prevent foreign bodies entering the pipe system to clog the same during the circulation of the dyeing medium.

The dyeing-machine is provided with new and novel means for retaining the compression top plate in position and to further provide means to deflect the dye liquor as it is supplied to the bottom of the vat below the material-supporting plate.

DYEING APPARATUS.

James Marshall, of Fall River, Massachusetts. Patent No. 796,668, dated August 8, 1905.

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This invention relates to improvements in dyeing and clearing vats in which articles to be treated are immersed in a succession of liquid solutions designed to set the color or to wash or clear the fabrics from any extraneous matter.

The machine consists of two vats having similar side and end sections placed end to end and holding a liquid solution adapted for successive application to the articles treated.

Above them is a third vat, having substantially the same width, of suitable depth. This vat holds hot or cold water or any solution desirable for washing or clearing the fabrics from any extraneous matter. These vats are arranged in upper and lower divisions supported by a substantial frame, as shown.

By a system of frames and link-belts the machine is arranged so that the material is transferred from one vat to the other, automatically making the process continuous, so that each article is treated exactly alike as to length of immersion and manipulation in the several solutions.

DYER'S JIGGER.

Carl Herminghaus, of Hilden, and Carl Gruschwitz, of Olbersdorf, Germany. Patent No. 801,871, dated October 17, 1905.

This invention relates to improvements in jiggers as employed in dyeing fabrics in the open width. The machine differs from prior apparatus for the same purpose, inasmuch as the dye, prepared in the vat itself, is forced against the traveling fabric by means of nozzles which suck the dye directly from the vat. The jets play upon the fabric traveling past them until the dyeing process is completed.

By means of the new apparatus, guarantee is offered for perfectly uniform all-through dyeing, so that even small quantities of fabric can be dyed by means of the new machine, whereas with prior apparatus there is always the disadvantage that the edges and ends of the fabric show a different color to that of the remaining part.

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YARN-PRINTING MACHINE.

Wayne K. Hawk, of Falls of Schuylkill, Pennsylvania, assignor to Nazar Costikyan, of New York, N. Y. Patent No. 802,809, dated October 24, 1905.

The invention relates to machines for producing printed yarns such as are used by carpet-manufacturers in making tapestry and velvet carpets, rugs, and like fabrics.

The object of the invention is to provide a new and improved yarn-printing machine arranged to permit printing yarns of any desired length, and more especially such as are required in the weaving of large rugs known as "art-squares," the arrangement being such that the same printing-drum will answer in printing long or short yarn.

The claims cover the details of construction.

DYEING APPARATUS.

Gustave A. Friedrichs, of Woonsocket, Rhode Island, assignor of one-half to Charles A. Proulx, of Woonsocket, Rhode Island. Patent No. 806,793, dated December 12, 1905.

This invention relates to dyeing apparatus; and it provides a simple and efficient apparatus designed more especially for expeditiously dyeing textile rovings and adapted to be used to advantage in dyeing other materials.

In this machine the material is packed in a basket of net-work, circular in form, and the dye-liquor is forced through it from the centre by means of a perforated supply pipe and a rotary pump.

The claims cover the details of construction.

MACHINE FOR DYEING FABRICS.

Jacques Cadgène, of Zurich, Switzerland. Patent No. 808,007, dated December 19, 1905.

The object of the present invention is to provide a simple and

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comparatively inexpensive machine of substantial construction to be able to dye various widths of materials—such as fabrics of pure cotton, wool, or zanello—but at the same time its parts have sufficient flexibility to be able to deal with all silk articles, from the most inferior up to the best quality.

Contrary to other systems for dyeing material in the piece, consisting in causing the stuff or material to circulate in the bath by the aid of small internal guide-rollers and of external delivery and receiving rollers of small diameter, the principle of the present system is to cause the stuff or material to travel by means of two cylinders of large diameter moving in the vat, but out of the bath or liquid. The stuff or material winding from and unwinding onto the cylinders during its passage takes up an approximately horizontal position in the bath.

To effect dyeing, short baths are used so that the pieces when they are wound on the cylinders may be always above the bath in order that the stuff makes contact with the dyeing-bath only when the latter in its travel follows an almost horizontal line, and as in this position the stuff offers a great surface in the dyeing-bath the following effects are attained: first, rapid dyeing of great uniformity without the least trace of darker tone on the edges of the pieces; second, the material fully utilizes the whole of the coloring-matter and the thread of the stuff is always straight; third, a considerable length of material may be dyed without the accumulated material on the cylinders forming too great a thickness; fourth, much steam is saved in avoiding reheats.

When the pieces have been sufficiently impregnated with color, they may be washed and their colors heightened by filling the vat with water and causing the cylinders to move until complete rinsing is effected. These operations are the more active, as the cylinders work right in the washing or color-heightening water. When all the operations of dyeing are finished, the pieces are wound on an apparatus fixed to one end of the vat, such apparatus acting as a drier or wringer.

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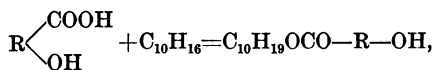
MISCELLANEOUS.

BORNYL ESTERS AND PROCESS OF MAKING CAMPHOR, &c.

Bruno Richard Seifert, of Radebeul, near Dresden, and Curt Philipp, of Dresden, Germany, assignors to Chemische Fabrik von Heyden, Actiengesellschaft. Patent No. 779,377, dated January 3, 1905.

The inventors have discovered a new class of aromatic compounds called "bornyl esters" of aromatic mono-oxy-carbonic acids. The typical representative of this new class of bodies is the salicylate of borneol ($C_{10}H_{17}OCOC_6H_5OH$), and the general formula of this new class is $C_{10}H_{17}OCO-R-OH$, wherein "R" means an aromatic nucleus. The substances of this new class of bodies are especially important on account of their manifold availability. They may be used in the manufacture of borneol and camphor. For this purpose the borneol is separated from the esters by the action of alkalis and oxidized to camphor in the known manner. Furthermore, the substances of this new class of bodies have important therapeutical properties. The salicylate of borneol and the paracresotinate of borneol have an antineuralgic and antirheumatic action when given internally or rubbed into the skin.

This new class of compounds are formed by heating aromatic mono-oxy-carbonic acids with terpenes ($C_{10}H_{18}$)—for example, pinene, camphene, mixtures containing pinene and camphene, like turpentine-oil. The chemical reaction takes place according to the equation



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wherein "R" means an aromatic nucleus. The reaction proceeds slowly already at temperatures below 100° C., but can be hastened considerably by higher temperatures.

WAX EMULSION AND PROCESS OF PRODUCING SAME.

Herbert H. Church, of Bellows Falls, Vermont, assignor to Casein Company of America. Patent No. 779,527, dated January 10, 1905.

This invention has for its object to provide a wax emulsion suitable for use in the arts, such as in the paper-manufacturing and textile trades or for laundry use, which will contain a large proportion of paraffin-wax in an emulsified condition, and which emulsion, while smooth and soft, may be produced at comparatively little cost.

This paraffin-wax emulsion is preferably produced in the following manner: To fifty parts, by weight, of paraffin-wax and fifty parts, by weight, of stearic acid are added about three hundred parts, by weight, of water. These ingredients are then thoroughly heated until the solid substances are completely melted. To the hot liquid is then preferably added about twenty parts, by weight, of borax previously dissolved in a small quantity of water, or instead of the borax, which has an alkaline reaction, a smaller quantity—say about ten parts—of an alkali, such as caustic soda, previously dissolved in water, may be used. The mixture should then be kept heated to the boiling-point with continual agitation. This heating and agitation should be kept up for at least half an hour after the addition of the borax and alkali. When the borax or alkali has first been added, the mixture will froth or foam considerably, and it is important to continue the boiling and agitation until such frothing or foaming has ceased and which will require at least half an hour. When the frothing or foaming has ceased and the product is cooled, the result will be a perfectly smooth and white wax emulsion.

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PROCESS OF PRODUCING ADHESIVES.

Hezekiah Kibbe Brooks, of Bellows Falls, Vermont, assignor to Casein Company of America. Patent No. 779,583, dated January 10, 1905.

This invention is based on the use of persulfate and acid and secures amylaceous adhesive products more nearly resembling animal glue than any of the similar products previously made.

The invention or discovery may be carried into effect in the following manner: Mix one hundred pounds of dry fecula with one pound of persulphate (preferably persulphate of ammonia) and fifteen pounds of water. Add two pounds of sulphuric acid, which will usually raise the temperature of the mixture to about 120° F. Should the temperature of the mixture not come up to this point, heat should be applied until the temperature of the mixture has been brought up to 120° F. The mixture is then preferably agitated at a temperature of at least 100° F., but preferably at a temperature of about 120° F., to modify the fecula. The mixture or modified fecula is then preferably washed or neutralized to eliminate the free acid and the resulting ammonium sulphate. If the product is to be employed as an adhesive to be applied to envelopes or labels, a well-washed material free from chemicals which impart a bad taste thereto is better than a neutralized material, although the neutralizing process by the use of any alkali or alkaline salt may be more quickly and easily performed. After being washed or neutralized the modified fecula should be heated to a temperature of about 150° F. or above, when it will quickly dissolve and present a very close resemblance in amber-colored appearance and transparency to dissolved animal glue and will be about the same density.

DEPILATING COMPOSITION.

John Campbell and William A. Rushworth, of Chicago, Illinois, assignors, by mesne assignments, to Schoellkopf, Hartford & Hanna Company. Patent No. 781,714, dated February 7, 1905.

The object of this invention is to produce a depilatory composi-

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tion which can be used in the form of a watery solution in which the hides are immersed or steeped and which operates quickly and effectively in loosening the hair without injuring either the skin or the hair.

This improved composition consists mainly of calcium sulphate and barium hydrate and contains barium hydrate in excess or as the preponderating ingredient.

The composition contains barium hydrate in excess or as the preponderating ingredient and does not dissolve or remove any part of the gelatinous tissue, grain, or substance of the hide or dissolve the hair-bulbs, as sodium sulphide does, but acts mainly by expanding the skin or hide, thereby loosening the hair-bulbs, so that the hair can be readily removed on the beam. The hide retains its natural suppleness, although increasing somewhat in weight, and the hair retains its natural strength even if the hide is allowed to remain immersed in the solution longer than is necessary to loosen the hair. The hides require no baiting or liming after treatment with the solution and are placed in a very receptive condition for the tanning material. The proportion of sodium sulfid in the composition is so small that this ingredient does not act to any material extent as a depilatory, but mainly to freshen and restore the grain and give the skin plumpness.

DICHLOR-DIMETHYL-FLUORANE AND PROCESS OF MAKING SAME.

Paul Julius, of Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin und Soda Fabrik. Patent No. 785,003, dated March 14, 1905.

This invention relates to the manufacture of dichlor-dimethyl-fluorane which can be used for the preparation of rhodamine coloring-matters, the method used being similar to that employed with dichlor-fluorescein (dichlorfluorane). It is claimed that this compound can be prepared by heating together phthalic anhy-

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drid and ortho-chlor-para-cresol in the presence of a condensing agent, for then the hydrogen atom which is in the ortho position to the hydroxyl group of the ortho-chlor-para-cresol reacts with the phthalic anhydrid and the pyrone ring is formed.

The pure compound forms small colorless crystals. It is easily soluble in chloroform and in hot nitrobenzene, but difficultly soluble in alcohol, ether, and benzene. It dissolves in concentrated sulfuric acid, giving a yellowish-green solution.

COATED OR IMPREGNATED FABRIC AND METHOD OF MAKING SAME.

Thomas E. Kinney, of Waverly, Ohio. Patent No. 785,110, dated March 21, 1905.

This invention relates to coated and impregnated fabrics, and has for its object to produce an improved fabric which is particularly adapted for use in the manufacture of gloves and mittens.

In the preferred process the fabric to be treated, cotton ticking, coverts, fleeced cotton duck, or other cotton fabric, is subjected to the action of a heated bath containing approximately ninety parts of paraffin, two and one-half parts of tallow, two and one-half parts of beeswax, two and one-half parts of rosin, two and one-half parts of linseed-oil, and from one hundred to two hundred parts of water. The bath is maintained at a sufficiently-high temperature to keep all of the ingredients in a melted condition, preferably at or about 212° F. The fabric may be coated or impregnated with the processing mixture in any convenient manner. The treated fabric is then hung in the dry-house until all the water has been evaporated.

Fabrics treated by this process are not only permanently water-resisting, but exhibit greatly-increased durability by reason of the treatment. Furthermore, the paraffin mixture will not crumble and loosen from the fabric under any amount of bending or hard usage however low the temperature, and the treated fabric has been found to possess a degree of permanency and unalterability before unattained.

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STARCH MATERIAL.

Julius Kantorowicz, of Breslau, Germany, assignor to Farbenfabriken of Elberfeld Co., of New York. Patent No. 785,216, dated March 21, 1905.

This invention relates to the manufacture of a new modified form of starch, which has the valuable property of swelling up with cold water to a viscous liquid-like "starch-paste." Such "paste," as is well known, can be obtained from ordinary starch only by treatment with hot water.

For the preparation of the new products any convenient kind of starch—"soluble starch," dextrine, or the like—is mixed with an alcohol (ethyl alcohol, methyl alcohol, &c.) or any other liquid with which starch does not swell up—such as acetone, a mixture of alcohol and ether, or the like—and the resulting mixture is then treated with an aqueous solution of an alkali, neutralized, and the new products isolated.

PAINT.

Louis A. Dreyfus, of New Brighton, New York, assignor to the Muralo Company. Patent No. 786,348, dated April 4, 1905.

The product of this invention has the advantageous features of the well-known cold-water paints plus those of an oil-paint—that is to say, it is mixable at the time of application with ordinary cold water—and has the low cost and other advantages of cold-water paints, yet at the same time after application to the wall or other surface to be covered it presents a waterproof surface measurably the same and for some purposes substantially the equivalent of the much more expensive oil-paint. It is adapted to use wherever either of these formerly-known paints are used either for interior or exterior applications. It is practically non-inflammable, practically odorless, and perfectly sanitary.

The essential features of the invention are that as a waterproofing ingredient petroleum or its by-products, which in this composition serves all the purposes of an ordinary paint oil, yet,

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owing to the peculiar characteristics of petroleum, is essentially different from such oil, because it will not saponify when brought in conjunction with the other ingredients and is likewise substantially non-oxidizable, so that the objectionable features of saponification, which are well known in this art, and likewise those resulting from oxidation are avoided in my composition.

PROCESS OF MAKING NEUTRAL SOAP.

August Paul Horn, of Hamburg, Germany. Patent No. 786,490, dated April 4, 1905.

According to the process forming the subject of the present invention certain decomposition products of albuminous substances are added to the primary components of the soap.

The following is the method of effecting the incorporation: Ordinary albuminous substances are first purified and freed from the adherent salts by dialysis. The product thus obtained is then decomposed by exposing it while under pressure to the action of heat by treatment with acids or alkalies or by some other suitable process. The albumoses obtained by this decomposition have the same structure and give the same color reactions as the native albuminous substances. Nevertheless they differ widely from the latter in many properties, viz: First, the albumoses are not coagulable; second, their behavior toward the salts which are to be precipitated from them differs from that of the native albuminous substances; third, the albumose-acid salts formed with alkalies are much more stable when hydrolyzed than are alkali albuminates, and, fourth, the albumoses have a stronger acid reaction than native egg-white or albumen. In view of their above properties the albumose preparations are eminently adapted for the production of soaps which remain neutral when hydrolyzed. The albumose preparations obtained by the above decomposition process are added to the soap ingredients either during the saponification process or else subsequently during the pilling operation. The soap thus produced is perfectly neutral and remains so on hydrolysis, for the alkali which is thereby set free

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becomes fixed while *in statu nascendi* as albumose-acid alkali. Hence the water used in washing remains perfectly neutral—an effect which is not obtained with any other soap.

SOAP AND METHOD OF MAKING SAME.

Hermann Giessler and Herman Bauer, of Stuttgart, Germany. Patent No. 786,556, dated April 4, 1905.

This invention relates to the production of a soap which will combine cleansing, bleaching, and antiseptic properties without, however, being liable to deteriorate by decomposition or to injure or destroy the surfaces of goods to which it is applied.

The inventors claim that soaps possessing the above-indicated characteristics may be produced by mixing with a suitable soap body stable salts of the higher (super) acids, and particularly the alkali or ammonium salts of the higher (super) acid compounds of boron or carbon. These salts may be added to the soap body either alone (preferably in powdered condition) or mixed with fatty bodies free from glycerin.

The following salts are eminently suitable for the purpose of the invention on account of their high stability and of their high contents of oxygen, as well as on account of their easy manufacture: sodium perborate, (NaBO_3 or $\text{Na}_2\text{B}_4\text{O}_8$), or ammonium perborate, (NH_4BO_3), or sodium percarbonate (Na_2CO_4). One of these salts or mixtures of two or more of them are added in a suitable condition, preferably powdered, to a soap body, which may be of any approved constitution—for instance, any of the usual soaps.

TREATING SHEEP'S WOOL.

Albert Kann, of Heidelberg, Germany. Patent No. 787,923, dated April 25, 1905.

This process is based on the fact that if sheeps' wool or other keratinic fibres—that is to say, any kind of animal hair—are treated with a solution of formic aldehyde of the formula CH_2O for some time in the cold, or better in the heat, or by the vapors of formaldehyde and are afterward dried without preliminary

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washing, it will be found that by this treatment the fibre has become much less liable to be affected by the action of strong bases in the heat—as, for instance, caustic alkalies, carbonates of alkali, alkali sulphides, alkaline earths, &c.—as well as by the action of steam and of boiling in water of neutral reaction without diminishing in the whole the useful properties of the wool. The fibre so treated will resist better the action of the said chemicals and will not be shortened or shrunk.

If heat is used in the operation the length of time may be reduced.

PROCESS OF MAKING FELT CLOTH.

James B. Levan, of Philadelphia, Pennsylvania. Patent No. 789,098, dated May 2, 1905.

The claims cover—

1. The process of making felted cloth as herein described, consisting in cutting the material of which the cloth is to be made into short-length fibres, partially felting and dyeing and thoroughly drying it, then completing in warm oil the felting of the crude fabric so formed, and finishing the cloth with emery or other suitable paper or material and by pressing with a heated iron.

2. The process of felting cloth, which consists in felting the material while submerged in or saturated with warm oil.

3. The process of felting cloth, which consists in dyeing the material and felting same while submerged in or saturated with warm oil.

4. The process of felting cloth, which consists in felting the material while submerged in or saturated with warm oil and finishing the fabric while still thoroughly impregnated with oil by means of emery or other suitable paper or material.

PAINT COMPOUND. -

Louis Spencer Flatau, of St. Louis, Missouri. Patent No. 789,600, dated May 9, 1905.

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This invention relates to an improved paint compound. It is designed more especially for use upon and for treating heated metal surfaces, more particularly the front ends and stacks of locomotive and other engines and like purposes.

The claim covers the process of producing a paint compound, which consists in reducing gilsonite by grinding to a powder; combining with naphtha said gilsonite in powder form by sifting the latter upon said naphtha; and adding to the aforesaid ingredients boiled linseed-oil and gloss-oil, and then thoroughly amalgamating this mixture by the agitating action of a mill.

TRIACETYL CELLULOSE.

Arthur Eichengrün and Theodor Becker, of Elberfeld, Germany, assignors to Farbenfabriken of Elberfeld Co., of New York. Patent No. 790,565, dated May 23, 1905.

This invention relates to the production of a new acetylated derivative of cellulose. The process for preparing this new body consists in treating cellulose with a mixture of acetic anhydride and sulfuric acid at temperatures below 50° C.

The new body thus prepared is a whitish voluminous mass and possesses very valuable properties. In a dry state it is readily soluble in chloroform, epichlorhydrin, nitrobenzene, and glacial acetic acid, soluble in acetone and pyridin and insoluble in alcohol ether, acetic ether, amyl acetate, and glycerin. It is not attacked by cold alkaline carbonates, ammonia, or dilute acids, and but with great difficulty by caustic alkalies.

The concentrated solutions, especially that in glacial acetic acid, have the characteristic property that on being poured into a liquid which does not dissolve the new acetylated cellulose—such as water, alcohol, or formic aldehyde, or the like—they deposit peculiar cylindric precipitates, including a large quantity of the liquid. On drying the said precipitates shrink to hard oblong bodies. The new acetyl cellulose is decomposed on heating it to about 250° C.

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LUMINOUS PAINT.

Hugo Lieber, of New York, N. Y. Patent No. 791,631, dated June 6, 1905.

The preferred form of composition is self-luminous, but fire-proof and tenacious. One form contains a composition of zinc sulphide and radium-barium carbonate mixed with a body formed of soluble cotton and wood-alcohol, acetone, and castor-oil. These are preferably mixed in the following manner: First, about six parts of alcohol are mixed with two parts of acetone. Then the soluble cotton is dissolved in the fluid in proportion of about one pound of cotton to three gallons of the fluid. Next about a pint of oil is mixed with one gallon of the prepared mixture. This completes the body. Then the sulphide is mixed in the proportion of one ounce to six ounces of the prepared body. The radium compound is preferably added to the luminescent material before mixing with the body. The resultant composition dries very quickly, is highly luminous, non-inflammable, and tenacious. It, in fact, acts as a fireproofing to any surface to which it may be applied and yet is highly luminous. The alcohol and the soluble cotton form a durable and adhesive body. The acetone assists the alcohol in solution and increases the flexibility of the applied composition. The oil greatly increases the smoothness and dries quickly. The zinc sulphide is highly luminescent and with the acetone entirely counteracts the inflammability of the cotton. The radium compound increases and maintains the luminosity of the composition by exciting the sulphide. Amyl acetate may be substituted for the acetone in the body. The resultant body is transparent and gives superior results in color and luminosity.

CATALYTIC APPARATUS FOR MAKING SULPHURIC ANHYDRID.

Georg Eschellmann and Albert Harmuth, of St. Petersburg, Russia, assignors to Tov. Tentelevskago Khimichesk Zavoda. Patent No. 792,205, dated June 13, 1905.

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This invention relates to improvements upon apparatus for the manufacture of sulphuric anhydrid from sulphurous-acid gas and oxygen or atmospheric air by the agency of suitable catalytic substances, and especially upon apparatus of this kind in which a large chamber is arranged in front of the catalytic substance contained in a system of tubes (called "catalytic tubes") and is supplied through an opening in its top with the gaseous mixture to be treated from a preheater in which the said mixture is heated according to the indications of a thermometer placed in said large chamber in the zone next to the upper extremities of the catalytic tubes. The purpose of arranging said large space or chamber in front of the catalytic substance is to enable the latter to automatically prevent accumulation of surplus heat within it by at once transferring the same by radiation to a large body of gases. Now it is found that the efficiency of said apparatus will be considerably increased by subdividing the catalytic substance into two portions, arranging one portion as a uniform even layer in front of the tubes, which are filled with the remaining portion of the catalytic substance, and protecting the catalytic tubes against losses of heat, while the upper layer is allowed to freely radiate heat into the large gas-chamber in front of it. With this subdivision and modified arrangement of the catalytic substance in an upper portion which is cooled by radiation and a lower portion which is protected against cooling the same quantity of catalytic substance as used in the older apparatus has proved to be able to transform from ninety-five to ninety-seven per cent. of the sulphurous-acid gas presented to it into sulphuric anhydrid with the assistance of but one-half of that amount of power which it is necessary to apply when all of the catalytic substance is placed in the tubes as in the older apparatus. This rise of efficiency obtained by the described modified arrangement of the catalytic substance is believed to be principally due to the increased heat-radiating capacity of said substance resulting from the increased surface given to the upper portion thereof by spreading out the same over a by far larger surface than that

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which the catalytic substance will present to the body of gases in front of it when exclusively contained in tubes.

PROCESS OF MANUFACTURING FILAMENTS FROM VISCOSE.

Charles A. Ernst, of Lansdowne, Pennsylvania, assignor to Silas W. Pettit, Philadelphia, Pennsylvania. Patent No. 792,888, dated June 20, 1905.

In this process the spinning-bath comprises a dehydrating reagent which is otherwise inert toward the viscose, the preferred ingredient being wood-alcohol. With this is combined an organic acid and a salt of an organic acid in solution in such acid, the preferred reagents being acetic acid and sodium acetate. As a working formula for a bath thus constituted with ordinary commercial wood-alcohol about six per cent. of acetic acid should be added and the mixture substantially saturated with sodium acetate. Glacial acetic acid is preferably employed in order to minimize the incidental addition of water. The viscose is discharged into this bath in the usual manner through the spinneret, and the spun filaments are wound immediately after their emergence from the setting-bath. The complete reversion of the viscose is then effected, preferably, by immersion in a bath containing an inert dehydrating reagent and an organic acid alone. For this bath wood-alcohol and glacial acetic acid are used in the proportions above stated for those ingredients. The reverted filament is then washed and dried.

CATALYTIC APPARATUS FOR MAKING SULPHURIC ANHYDRID.

Max Schroeder, of Düsseldorf, Germany, assignor to the New Jersey Zinc Company. Patent No. 793,543, dated June 27, 1905.

This invention relates to certain new and useful improvements in the manufacture of sulphuric anhydrid (SO_2) by the so-called

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"contact" process, wherein the gases from roasting-furnaces or the like and which contain varying quantities of sulphurous anhydria (SO_2) and oxygen are caused to pass through apparatus containing a contact mass whose catalytic action causes a union of the sulphurous anhydrid and oxygen and the consequent production of the sulphuric anhydrid, which latter is recovered by absorption.

The characteristic feature of the present improvement consists in avoiding the difficulties due to heat radiation in apparatus of the type referred to by a construction wherein the gases which pass in contact with the walls of the apparatus and the gases which pass through the central portion of the contact mass are mixed at least once, and preferably several times, on their passage therethrough. By this expedient the excessively-cooled gases which pass in contact with the walls of the apparatus are from time to time intimately intermingled with the hotter gases traversing the interior of the mass, so that an average temperature is established for the mixture. Because of the relatively smaller volume of the excessively-cooled gases, this average temperature is still sufficient to maintain the most favorable conditions for the catalytic action of the contact mass upon the entire volume of SO_2 present.

PROCESS OF EXTRACTING TANNING SUBSTANCES.

Georg Ferdinand Bögel, of Altona, Germany. Patent No. 794,847, dated July 18, 1905.

This invention relates to a process for the continuous extraction of tanning materials within a battery of centrifugals. To obtain a thorough extraction, even with short batteries, only a part of the substances thrown off from one centrifugal is conveyed to the succeeding centrifugal, while the remainder is returned to the first centrifugal. The comminuted tanning material is introduced into a number of centrifugals placed side by side. Fresh water is supplied to one of the centrifugals, which by the rotation of the latter is driven through the layer of tanning material that accumulates

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upon its wall, so that the water becomes enriched by the tannin. The thrown-off and accumulated lye is then pumped partly into the next centrifugal and partly back into the first centrifugal, where it is again driven through the layer of tanning material, and so on through the entire series. From the last centrifugal half of the lye passes into the discharge-pipe, while the other half passes back into the last centrifugal. In this way a complete extraction of the tanning material may be obtained without injuriously affecting the same.

MANUFACTURE OF ARTIFICIAL THREADS FROM SOLUTIONS OF CELLULOSE.

Rudolf Linkmeyer, of Herford, Germany. Patent No. 795,526, dated July 25, 1905.

This process consists, broadly, in first of all producing in a first weak bath of ammoniacal oxid of copper a swelling of the fibres and a deposit of oxid of copper upon them and in then effecting solution in a concentrated solution of ammoniacal oxid of copper. In this manner a solution is obtained the very pronounced viscosity of which is extremely advantageous for spinning.

It has been found that the solution of the cellulose is effected very efficiently if the cotton, bleached or boiled for some hours, is first of all placed, either in a dry or humid condition, in a weak bath of ammoniacal oxid of copper, to which may be added with advantage a small quantity of caustic soda. This first bath serves to soften, swell, and disintegrate to some extent the fibres and to fix upon them the oxid of copper dissolved by the ammonia. The fibres then dissolve speedily and readily in a concentrated solution of ammoniacal oxid of copper. By proceeding in this manner the conversion of the cellulose into oxycellulose or the hydration of the fibres is avoided. Further, the success of the solution depends less upon the temperature than upon the other processes. Solution takes place equally well at 10° to 15° C. as at a lower temperature.

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MORDANT.

George McClellan Lawton, of Worcester, Massachusetts. Patent No. 797,588, dated August 22, 1905.

In the process of dyeing described in U. S. Patents 763,616 and 768,809, the finishing-bath employed is composed of chip or extract of logwood, other dyes to give the desired cast of shade, and the developer. These ingredients are varied to give the shade desired. The said finishing-bath is boiled for about one and one-half hours, and to it the fastener or mordant, which forms the subject-matter specification is added.

The fastener or mordant which is added to the finishing-bath is a liquid, is boiled for about forty-five minutes, and is composed of water, sulphate of iron, pyrolignite of iron, and nitrate of iron, combined in suitable proportions.

PAINT COMPOSITION.

William A. Hall, of Bellows Falls, Vermont. Patent No. 797,683, dated August 22, 1905.

This invention relates to a paint composition containing oil, but suitable to be mixed up with water to form what is known as a "water-paint," and which is of such a character that when applied to surfaces to be coated it will be water-resisting and will withstand the action of the weather.

This improved paint composition, containing, as it does, a certain percentage of oil, forms a coating tougher or more tenacious than the water-paints now generally in use, and is therefore much less liable to wash off.

The improved paint composition comprises a mineral or earthy base, as whiting or talc (preferably whiting), a vegetable oil, which may be either an oxidizing oil, such as linseed or Chinese tong or tung oil, or a non-oxidizing oil, such as cotton-seed oil or Indian-corn oil. If an oxidizing oil be used in the paint composition, such oil will become oxidized when applied to the surfaces to be coated and exposed to the air; but if a non-oxidizing

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oil be employed in the paint composition some oxidizing agent, such as alkalized casein, should be used in connection with it for the purpose of rendering it oxidizable when exposed to the air.

PROCESS OF TREATING HIDES.

Francis J. Oakes, of New York, N. Y. Patent No. 798,070, dated August 29, 1905.

The present invention relates particularly to the preparation of skins designed to produce such final leather products as are designated as "glazed." In such skins it is essential that the "grain" of the surface shall be as "low" and smooth as possible in order to insure the desired finish and appearance and also that the fibres shall be left in an open condition in order to secure the best results from the mineral tannage to which they are usually subjected.

This process consists, generally speaking, in subjecting the hides or skins after dehairing, as aforesaid, to the action of an aqueous bath containing sulphur and an albuminoid, thus dispensing with the excremental ingredients heretofore relied on for the purposes mentioned. By "albuminoids" is meant those organic bodies as a class which are characterized as containing nitrogen and phosphorus, being bodies more or less indiscriminately designated as "albuminous substances" or "proteids" or "nitrogenous matter," examples of which are, for instance, casein, blood albumin, animal tissue, fish, &c.

PROCESS OF TREATING HIDES.

Francis J. Oakes, of New York, N. Y. Patent No. 798,293, dated August 29, 1905.

The present well-known liming processes for loosening the hair and epidermis in depilating or dehairing result in leaving the hides in a swollen condition and with an undesired content of caustic lime. The processes employed to obviate this swollen condition and remove part of this lime are usually termed "bating"

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or "puering" and are essentially putrefactive in character. To extract the lime remaining thereafter, an additional process known as "drenching" is required, involving use of acid solutions.

The object of the present invention is to produce a process whereby said lime may be extracted with less destruction and loss of hide substance than heretofore, with more complete solution of the cementing material of the fibres, thus causing the hides to "fall" more perfectly from their said swollen condition, and without involving, necessarily, the so-called final "drenching" to extract the remainder of the lime. These and other desirable objects by the use of the following process immerse and soak the undesirably-swollen hides, with their lime content, in an aqueous bath containing sulphur and a carbohydrate. Any carbohydrate may be employed in conjunction with the sulphur, though glucose is at present preferable; also, that instead of sulphur any sulphur compound may be employed which will liberate some sulphur as such under the conditions existing in the bath, which involve as a distinguishing characteristic the presence of fermentative action in the carbohydrate, particularly the fermentative action which results in the production of ethyl alcohol.

Therefore it is preferable, if not essential, in all cases to introduce into the bath some specific ferment—such, for instance, as a small quantity of yeast sufficient to insure the aforesaid fermentation of the carbohydrate.

PROCESS OF TREATING HIDES.

Francis J. Oakes, of New York, N. Y. Patent No. 798,294, dated August 29, 1905.

In the usual bating and puering processes the baths employed have been found to be unduly alkaline, whereby the hides are undesirably "plumped," their gelatinous constituents injuriously affected, and their fibre consequently weakened, and it has heretofore been unsuccessfully sought to sufficiently neutralize such alkalinity during the application of the processes referred to, but without checking or impairing the requisite putrefaction and con-

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sequent bacterial action upon the hides depended upon for the lime extraction and also in certain cases for imparting a desired finish and appearance to the final leather product—as, for instance, in the case of so-called “glazed” leather.

The inventor claims that the desideratum referred to may be obtained by the addition of sulphur.

It seems that the putrefaction of the excrementitious substance referred to generates an undesirably large amount of ammonia, also hydrogen sulphide, which unites therewith to form ammonium sulphide, thus creating afterward in the bath a strong and injurious alkaline condition, but that this ammonium sulphide, together with any excess of ammonia present, coacts with the sulphur, as added, to form polysulphides having a much milder alkaline reaction, and consequently a less injurious and even a benign effect upon the hides as compared with that of the other chemical compounds which would otherwise be present—as, for instance, ammonium hydrate or ammonium carbonate.

PROCESS OF OBTAINING SOLUBLE STARCH.

Richard Hartwig, of Berlin, Germany, assignor to Siemens & Halske Aktiengesellschaft. Patent No. 798,509, dated August 29, 1905.

This invention relates to an improved process for obtaining soluble starch from raw starch prepared from any vegetable material, especially maize.

The process consists, essentially, in subjecting dry raw or crude starch at ordinary temperatures (about 50° to 86° F.), and during a prolonged time, to the action of an excess of gaseous chlorine.

In carrying out the process lead the chlorine to the raw dry starch contained within suitable vessels—for instance, within wooden casks—until some excess of chlorine in a gaseous state is present. The mass treated in such manner is left to rest for some days—for instance, four to eight days. The action is stopped when samples taken from the contents of the casks are found to be perfectly soluble in hot water.

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MANUFACTURE OF TOBACCO-LIKE PAPER.

Hermann Apel, of Konstantz, Germany. Patent No. 799,215, dated September 12, 1905.

This invention relates to a process for manufacturing a paper which when burned gives very nearly the same aroma and taste as a tobacco leaf or wrapper. For this purpose the paper is specially prepared by a special process forming the object of this invention.

The process consists in raw paper being impregnated with a tobacco decoction, which is allowed to ferment in the paper. If fresh unfermented tobacco decoction is used, the paper impregnated with it must be kept in a wet state for a time in order that the fermenting process may take place. If, however, a decoction that has already started to ferment is used, the time during which the paper is required to stand will be considerably reduced. The raw paper can be either thin paper or tissue made from ordinary paper-paste, or it may be a paper prepared in the well-known manner from parts of the tobacco-plant, such as the veins and waste.

CASEIN GLUE.

Francis X. Govers, of Owego, New York, assignor to Americus Manufacturing Company, of New York. Patent No. 799,599, dated September 12, 1905.

This invention relates to adhesives, and particularly to compositions of this character containing casein or compounds of casein, and has for its particular object to provide a strong stable waterproof casein glue of high penetrating power which is free from the disadvantages of casein glues and cements which have been heretofore used.

The inventor claims that a glue composition containing casein, trisodium phosphate, sodium hyposulphite, and formaldehyde is possessed of greater strength, stability, and penetrating power than has been obtained prior to the practice of this invention. Such a composition will not thicken nor decompose, but will re-

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main in a satisfactory workable condition for practically an indefinite period. It has an acid reaction, and its use is not attended by the injurious effects upon fabrics, brushes, and the like which is incident to the use of casein glues and cements containing relatively large amounts of alkali. It forms a very strong joint, which is practically waterproof.

In preparing my improved glue, dissolve the casein in a solution of trisodium phosphate and sodium hyposulphite and add the formaldehyde, preferably in the form of the forty-per-cent. aqueous solution known as "formalin."

FABRIC-COATING.

Francis X. Govers, of Owego, New York, assignor to Americus Manufacturing Company, of New York. Patent No. 800,145, dated September 26, 1905.

This invention relates to fabric-coatings, particularly casein coatings, and has for its object to provide an improved porous coating for paper, cloth, and the like which will be free from the disadvantages of coatings which have been heretofore used and which will flow well under the coating-brushes, producing a surface free from brush-marks and of a perfectly uniform appearance.

The material described in this invention consists of a coating containing casein, preferably sulphuric-acid casein or casein precipitated by sulphuric acid, an alkaline phosphate, preferably trisodium phosphate, and an alkaline hyposulphate, preferably sodium hyposulphite, with a base or filler of kaolin or china-clay and water, with or without the addition of blancfixe or satin white and wax, preferably wholly or partially saponified carnauba wax.

INSOLUBLE FABRIC-COATING AND METHOD OF MAKING SAME.

Francis X. Govers, of Owego, New York, assignor to Americus Manufacturing Company, of New York. Patent No. 800,146, dated September 26, 1905.

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This invention relates to fabric coating and sizing, and has for its principal object to produce an improved waterproof casein coating for paper and the like in which sulphuric-acid casein is utilized in a manner heretofore unknown, and it has for its further object to provide a casein coating which may contain as an ingredient thereof formaldehyde in any desired quantity without precipitation of the casein therein.

In the practice dissolve casein, preferably sulphuric-acid casein, in a solution containing sodium phosphate and sodium hyposulphite. To this add any desired amount of a suitable base or filler, preferably china-clay, sometimes with blancfixe or satin white and a small proportion of wax, preferably a wholly or partially saponified vegetable wax. To the casein solution with the base or filler, wax, &c., above, add a small percentage of formaldehyde, either by passing the gas through the casein solution or by using the forty-per-cent. formaldehyde solution known as "formalin." The addition of the formaldehyde may take place prior to the application of the casein solution to the paper or subsequent thereto. In the latter case it is preferable to employ the forty-per-cent. solution of formaldehyde referred to, and to immerse the coated fabric therein immediately after the application of the coating.

OBTAINING GUM-TRAGASOL FROM LOCUST-BEANS.

Robert Gray, George Osborn, Herbert Birtwhistle Stocks, and Henry Graham White, of Hooton, England, assignors to the Gum Tragasol Supply Co. Patent No. 800,369, dated September 26, 1905.

In the manufacture of gum-tragasol, which is obtained from the kernels or beans found in the pods of the locust or carob tree (*Ceratonia siliqua*), great difficulty has been experienced through the husks of the locust-kernels being of an extremely-tight-sticking nature and being impregnated with a soluble coloring-matter which dissolves in the gum and gives it a dark unsightly color.

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Hitherto these husks have been removed by a long and very expensive process of milling, and in these milling operations a considerable amount of gum is lost.

In carrying out this invention the whole kernels of the locust-bean are boiled for about half an hour in water, so as to equalize the softness of the shells, as those shells are in nature of very varying degrees of hardness. They are now drained of the water, which contains a considerable percentage of the objectionable coloring-matter of the husk. They are then steeped for four or five hours in cold water, which is then run off, and the kernels are placed in a washing-machine called a "whizzer," which removes all moisture from the outside of the husks. The kernels are now put through one or more brush decorticating-machines, which separate the husks from the cotyledons. Then the cotyledons, which contain the gum, are placed in mashing-vats immediately, and the gum is extracted in the usual way. After decorticating the cotyledons from the husk and germs should it appear necessary to further clear the gum from any remaining coloring-matter which might be present either from the husk or germ we add a small quantity of alum, a solution of sulfate of alumina, or other mordant which will form a lake with any coloring-matter left in the cotyledons, and then proceed to extract the gum in the usual way.

PROCESS OF PRODUCING LACTALBUMEN AND MILK-SUGAR.

Alexander S. Ramage, of Detroit, Michigan, assignor to Ramage Technical Company. Patent No. 801,691, dated October 10, 1905.

This invention is a process of treating whey to recover therefrom the proteid contents or lactalbumen and the lactose.

In carrying out the process clear whey is rendered slightly alkaline with any suitable agent—for example, lime-water or sodium carbonate. The whey is then evaporated to dryness, preferably in a rotary vacuum film drier, such as one of the Passburg type, at

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a temperature not above 145° F. The dried whey is dissolved in a minimum volume of water and an equal volume of alcohol, preferably methyl-alcohol, is added. The lactalbumen is thereby precipitated and is filtered off. To the clear filtrate is added an equal volume of alcohol, preferably methyl, and the mixture is allowed to stand until the lactose has been thrown down as a pure white finely-crystalline deposit. The lactose is filtered off and washed with methyl-alcohol. The final filtrate and washings are distilled to recover the alcohol.

MANUFACTURE OF PRINTING-INK PIGMENTS.

Peter Fireman, of Alexandria, Virginia, assignor of one-half to Edward G. Portner. Patent No. 802,928, dated October 24, 1905.

The lack of uniformity in the physical properties of carbon-black (known under various other names—such as “lampblack,” “vegetable-black,” &c.), the pigment universally used in black printing-inks, and the resulting uncertainty in the working quality of the black printing-inks is a great obstacle in the way of bringing on the market a good ink of moderate price. In the ink described these disadvantages are in a great measure overcome by replacing the carbon-black by a complex product or pigment made up of precipitated black magnetic ferro-ferrie oxid prepared by a new and improved process. This process consists in dissolving a ferrous salt, precipitating the salt by a substance having an alkaline reaction, oxidizing the precipitate by a current of air, ascertaining the degree of oxidation by analysis of samples taken from time to time and terminating it when the desired degree of oxidation is reached, and then filtering, washing and drying it.

PROCESS OF LIBERATING AND SEPARATING FIBERS.

Henry Spencer Blackmore, of Mount Vernon, New York. Patent No. 803,391, dated October 31, 1905.

In carrying out this process the stalks containing the fibre to be

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treated are placed in a receptacle containing a ten-per-cent. solution of alkali aluminate, such as sodium aluminate, preferably heated to about 200° F. The receptacle is then closed and the stalks allowed to digest for about an hour, when the pressure is preferably reduced by exhaustion, which withdraws from the stalks any occluded air within the pores between the fibres.

The stalks containing the alkali aluminate are then removed from the chemical bath and thoroughly washed, and are then subjected in their moist condition to the action of ammonia-gas, under pressure of about one hundred pounds, which is absorbed by the moisture within the pores between the fibres with great avidity. After subjecting the fibres to the action of ammonia-gas for about thirty minutes the supply of ammonia-gas is cut off and carbon dioxide is introduced under a pressure of about three hundred pounds, which immediately combines with the ammonium hydroxide within the pores between the fibres, forming ammonium carbonate, bicarbonate, and carbamate, thereby increasing the bulk of chemical salts to such a degree within the pores that the fibres are readily separated from each other and the alkali neutralized by combination with the carbonic acid. The pressure is then reduced, the stalks removed and thoroughly washed with water, the ammonium salts being removed, leaving the fibres clean and practically free from each other, and which after drying and bleaching are in condition for mechanical treatment and manufacture into textile articles.

PROCESS OF LIBERATING, SEPARATING, AND BLEACHING FIBERS.

Henry Spencer Blackmore, of Mount Vernon, New York. Patent No. 803,392, dated October 31, 1905.

The stalks of whatever fibre is to be treated are placed in a receptacle containing a ten-per-cent. solution of alkali aluminate, such as sodium aluminate, preferably heated to about 200° F. The receptacle is then closed and the stalks allowed to digest for

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about an hour, when the pressure is preferably reduced by exhaustion, which withdraws from the stalks any occluded air within the pores.

The material is then subjected to an increased pressure of steam to about sixty pounds, which further heats the solution and drives it into the material, thus thoroughly saturating it with alkali aluminate.

When this treatment is finished the alkali salts are dissolved out by thoroughly washing with water. The stalks containing alkali aluminate are then removed from the chemical bath and exposed to the action of sulphur dioxid under pressure of about one hundred pounds, which decomposes the alkali aluminate within the pores between the fibres, liberating aluminium hydroxid or hydrated oxid, which, together with the alkali sulphite simultaneously produced, increase in bulk and segregate the fibres from each other, while the sulphurous constituent of the material bleaches the fibres thus separated. The pressure is then reduced and the stalks thoroughly washed with water, the alkali salts being thereby removed, leaving the fibres practically free from each other, but retaining a portion of the aluminium hydroxid, which is finally removed by treatment with a dilute alkali solution, such as a five-per-cent. solution of caustic soda, which combines with the aluminium hydroxid, regenerating alkali aluminate, which is employed for further operation, leaving the fibres clean and bleached, and which, after drying, are in condition for mechanical treatment and manufacture into textile articles.

NON-INFLAMMABLE CELLULOID AND PROCESS FOR THE PRODUCTION THEREOF.

George Edward Woodward, of Boston, Massachusetts. Patent No. 803,952, dated November 7, 1905.

The present invention relates to an improved process for the production of non-inflammable celluloid, the object being to produce a celluloid which on coming into contact with a flame does

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not ignite, but even under unfavorable circumstances only chars. The other good qualities of the celluloid are not influenced by treatment according to the present process, so that the non-inflammable celluloid can be used and employed like the untreated substance—for instance, for photographic as well as for kinematographic films, in place of vulcanite, as insulation of electric conductors, for the production of plastic objects and the like, or otherwise.

The process consists in mixing the celluloid with liquefied fish-glue with an addition of gum-arabic, gelatin, and rape-oil.

PROCESS FOR MANUFACTURING FILMS OR THREADS OF CELLULOSE.

Max Fremery, of Oberbruch, and Emil Bronnert, of Mülhausen-niedermorschweiler, Germany, and Johann Urban, of St. Pölten, Austria-Hungary. Patent No. 804,191, dated November 7, 1905.

It has been proposed to manufacture forms of cellulose containing copper by treating ammoniacal cupriferous solutions of cellulose with an alkali, for such forms are in high degree water-proof in comparison with the forms of cellulose free from copper, which are obtained when similar cellulose solutions are treated with an acid or by preferably weak caustic soda and washing with an acid for removing all the copper.

By this invention cupriferous forms of cellulose—such as threads, films, or the like—are made by injecting in the known manner solutions of cellulose in ammoniacal cupriferous solutions into strong caustic-alkali solution and afterward immersing the forms thus produced for some time, such as for half an hour or one hour or longer, in a cold strong solution of caustic alkali—for instance, a solution containing not less than twenty per cent. of caustic soda. This solution may be that into which the cellulose solution was injected in order to produce the form, in which case it will contain a little ammonia. The ammonia is advantageous provided it does not exceed about six per cent. of the solution when

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it begins to dissolve the surface of the cellulose form, and thus to roughen it. It is better, however, to use a fresh solution of caustic soda and to apply it with aid of centrifugal action.

The process is particularly applicable for making thick, highly-elastic, transparent, and unusually-strong threads and films, such as artificial horsehair, which has not hitherto been made in a single operation, embroidery-threads, and photographic films. The threads after carbonization serve as electric-light filaments and the carbonized films for telephonic purposes. To avoid deformation, the forms made according to this invention must be dried under tension, but at the ordinary temperature.

PAPER CHARACTERIZED BY ITS IMPERVIOUS NATURE AND STRENGTH.

Charles Ignatius Goessmann, of Worcester, Massachusetts, assignor to Vellumoid Paper Company, of Amherst, Massachusetts. Patent No. 804,808, dated November 14, 1905.

This invention relates particularly to paper the product resulting from novel treatment either during the primary process of manufacture into paper or after the same has been manufactured. The treatment consists first in saturating the paper with glutinous material, preferably animal glue, and the bath of this material should be hot when applied to effect its more rapid absorption. As the paper passes from the gluten-tank, the surplus matter is removed from the surface by mechanical means by preference pressure rolls. The strength and consistency of this bath may be varied to suit the material being treated and the uses for which it is intended.

After leaving this bath, the paper before drying is passed through a solution of formaldehyde and water to set the glutinous material. After leaving the formaldehyde bath the paper is squeezed again and dried.

In order to render the paper pliable and suitable for commer-

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cial uses it is then run into a bath of hot water, saturated steam, or equivalent heat-and-moisture medium, thus causing the fibres and the non-soluble glutinous material filling the interstices to expand in all directions, and at the same time a change (hydration) takes place, whereby the hardened mass of fibre, glutinous material, and formaldehyde becomes tempered and softened and the strength imparted by the previous treatment increased.

PROCESS FOR THE MANUFACTURE OF THREADS OR FILMS OF CELLULOSE.

Max Fremery, of Oberbruck, and Emile Bronnert, of Mülhausen-Niedermorschweiler, Germany, and Johann Urban, of St. Pölten, Austria-Hungary. Patent No. 806,533, dated December 5, 1905.

By the present invention a cupriferous ammoniacal solution of cellulose is injected into an acid, preferably sulfuric acid of thirty to sixty-five per cent. strength, as described in U. S. Patent No. 698,254, whereby the advantage of recovering the copper and ammonia is retained, but the threads or films produced are treated with a strong caustic-alkali solution—for instance, a cold solution containing not less than twenty per cent. of caustic soda. For this purpose the threads or films as they are produced may be wound on a cylinder, which is then rotated for some time in a bath of cold strong caustic-alkali solution, or the threads or films may be placed in the perforated drum of a centrifugal apparatus and the cold strong caustic-alkali solution may be introduced under pressure through the axle of the drum. In either case the treatment is followed by washing with water, preferably in the manner described in U. S. Patent Nos. 661,214 and 705,748, until all caustic soda has been washed from them, and finally with water containing a small proportion of a dilute acid, like acetic acid. The threads or films are then dried under tension, as described in U. S. Patent Nos. 650,715 and 691,257.

The films and thick threads made according to this invention

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are as transparent as glass, very strong, and about twice as elastic as those produced by the older processes.

LACTIC MORDANT.

Alan A. Claffin, of Littleton, Massachusetts. Patent No. 807,019, dated December 12, 1905.

When lactic acid is used alone as an assistant mordant, its strong reducing power and penetrating capacity render its action too drastic and rapid for accomplishing even and uniform dyeing; and the object of this invention is to modify and regulate its action in such manner as to enable its valuable properties to be more efficiently and satisfactorily utilized. This is done, the inventor claims, by mixing it in solution with ammonium acetate or other neutral ammonium salt, such as ammonium sulphate, ammonium oxalate, or ammonium formate. Advantage is thus taken not only of the presence of ammonia in an ionic state within the solution, but also of the tendency of such ammonium salts to decompose slowly upon heating their aqueous solutions and gradually to give off ammonia to the water-vapor even when an excess of acid is present in the solution. Such a mixture of free or uncombined lactic acid with a neutral ammonium salt constitutes an assistant mordant, which in the mordant-bath or in the dye-bath not only promotes and facilitates the effective action and thorough penetration of the principal mordant or the dyestuff, but also at the same time causes and secures the slow and uniform deposition of the same in and upon the material to be dyed. The proportion of free lactic acid to neutral ammonium salt depends upon the acid, neutral, or basic character of the principal mordant or of the dyestuff with which this assistant mordant is to be used.

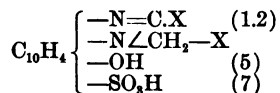
SULPHO-ACID AND PROCESS OF MAKING SAME.

Georg Kalischer, of Frankfort-on-the-Main, Germany, assignor to Cassella Color Company, of New York, N. Y. Patent No. 807,117, dated December 12, 1905.

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The claims cover—

1. The process of producing new sulpho-acids of the general formula



(in which X represents an aromatic radical) by condensing in aqueous solution one molecule of 1.2. diamidonaphthalene.5.oxy.7.-sulpho-acid with two molecules of an aromatic aldehyde.

2. The new sulpho-acids obtained by condensing in aqueous solution one molecule of 1.2-diamidonaphthalene.5.oxy.7.sulpho-acid with two molecules of an aromatic aldehyde, the said substances being powders of a slightly-yellowish tinge insoluble in water, alcohol and ether, soluble in alkalies and being precipitated from these solutions by means of acids.



PART IV

**Notes on Processes
New Colors, etc.**





Notes on Processes, New Colors, etc.

MAKING WOOLEN FABRICS UNSHRINKABLE.

Wool has the property of absorbing chlorine very readily and acquires some valuable properties. It was noted by John Mercer, as long ago as 1839, that chlorinated wool has a much greater affinity for dyes than wool that has not been treated, and this property has been much taken advantage of in the dyeing of wool, and in particular in working in conjunction with the range of acid-blacks, and wool dyers should certainly take advantage of this property more than they do at present in working with these blacks.

Another valuable property of which advantage has been largely taken during recent years is that chlorinated wool does not felt so easily as untreated wool, and therefore fabrics and garments prepared with chlorinated wool are unshrinkable, or practically so. The work is not at all difficult, although, like many others, it requires some care and judgment to get the best results.

The process of dealing with 100 pounds of, say, knitted woollen garments is as follows: 4 pounds of good bleaching powder is carefully mixed with 100 gallons of water, well stirred in and allowed to settle, then the clear liquor poured into another vat. It is important that no undissolved particles of bleaching powder be left in. The goods to be made unshrinkable are put into this bath and well handled for 15 to 20 minutes, then taken out and put into a second vat containing 5 pounds hydrochloric acid and 100 gallons of water for ten minutes, after which they are taken out, well rinsed in water and dried. The goods should be

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entered as rapidly as possible into the baths. Some workers acidify the wool first and chlorinate afterwards; others mix the bleaching powder and acid together, but this often leads to loss of chlorine, the effect of which is disagreeable to the workers, as chlorine gas is most unpleasant to breathe.

Practice shows that 4 pounds good bleaching powder to 100 pounds of goods is about the minimum quantity to use that will give an unshrinkable effect. More may be used, but in this case there is a greater risk of producing two rather undesirable effects, that of imparting a yellow color to the wool fabrics and that of making them harsh. Much depends upon the quality of the wool being treated, and workers should ascertain for themselves the maximum amount of bleaching powder they can use without producing this yellowness; some recommend as much as 10 pounds to the 100 pounds of goods, but this is rather excessive. Any harshness may be removed by working for half-an-hour in a bath made of 125 pounds acetate of alumina, 18° Tw., and 250 gallons of water for 100 pounds of goods. This may be used cold, but the employment of heat, say 150° F., facilitates the action. After this bath the goods are well washed in water.

It is well to pass the goods, after the washing process, through a weak bath of ammonia to neutralize any acid for the goods, after the chlorination treatment, have an acid reaction which makes them slightly harsh; the alkaline treatment softens them.

THE DYEING OF INDIGO MLB ON WOOLEN YARN.

For the dyeing of blues on woolen yarns Indigo MLB, applied in one or the other of the various hydrosulphite vats, is of very great service both when the indigo is used by itself or when the blue serves as a bottom for other colors.

In preparing the vat with Indigo MLB 20 per cent. paste, a stock vat is first prepared from 44 pounds Indigo MLB 20 per cent. stirred with 1½ gallons caustic soda 42° Tw., and 8½ gallons

Notes on Processes, New Colors, etc.

of Hydrosulphite 0, or with 24 gallons hydrosulphite of soda. The hydrosulphite is prepared by mixing 10 gallons of bisulphite of soda 70° Tw., with 20 gallons of water, and with a paste of 10 pounds zinc dust and 1½ gallons of water. The mixture should be well stirred, the temperature will rise a little but it ought not to be allowed to go much higher than 95° to 100° F. After standing one or two hours, the clear supernatant liquor is run off and mixed with milk of lime made from 10 pounds quicklime in 2½ gallons of water. Stir the mixture well, then allow to stand for two hours, pour off the clear liquor and to every 10 gallons add ¾ pint of caustic soda 42° Tw. Store the hydrosulphite so made in well closed vessels. As this solution does not keep well it is advisable to use Hydrosulphite 0 Hoechst which is more stable.

The stock vat, as made above, may be made of any quantity either larger or smaller than is given above. It should have a clear greenish yellow color and be free from any turbidity. If the color is green there is insufficient hydrosulphite; if yellow, too much; the remedy in both cases is obvious. If the liquor be turbid there is too little caustic soda. It is important to avoid the use of too much caustic soda as it has an unfavorable action on the wool fibre.

The dye vat is made with the usual amount of water, and 1 gallon of hydrosulphite is added to each 500 gallons of the water in order to remove any oxygen the water contains that might act detrimentally on the indigo. Sufficient of the stock vat is then stirred well in and allowed to stand. The condition of the vat should be ascertained, as indicated above, and brought to the right state by addition of hydrosulphite or caustic soda, as may be required.

In dyeing it is necessary to immerse the yarn below the surface of the liquor. This is effected by arranging the sticks on which the yarn is suspended to hang on rails running on the side of the vat. A better plan is to use bent iron sticks resting on the edges of the vats, as these are more handy to handle and

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work. The best temperature to work at is 100° to 110° F. The yarn is worked for twenty to thirty minutes, care being taken in working not to expose the yarn to the air. At the end of the time the yarn is taken out, well wrung out, and then hung in the air for the blue to properly develop. For pale blues one dip is enough; for deep shades two to three dips will be needed, oxidizing in the air between each. After the blue is fully formed, rinse the yarns in a weak sulphuric acid bath; this helps to develop the blue, and, at the same time, any risk of damage to the wool from the alkalinity of the bath is avoided. Pale sky blues can be raised without airing by rinsing off in a weak acid bath.

As the various lots of yarns are run through the vat this becomes exhausted of indigo and must be replenished from time to time by additions of hydrosulphite stock vat and a little alkali. Pale shades require more alkali than deep shades. When deep shades are dyed, the amount of stock indigo vat to be added is about half of that originally added; with medium blues about one-third, and with pale tints one-fourth the starting quantities. Practice soon puts the dyer right as to the quantities to be added. At the end of a day's work, it is well to make up the vat again, add a little extra hydrosulphite and alkali, stir well and allow to stand till next morning, when the vat will be in good condition for working.

Used in the manner given above, Indigo MLB 20 per cent. paste will be found to work excellently and give pure shades of blue.—*Dyer and Calico Printer.*

DIRECT SILK PRINTING.

The silk is de-gummed with about 30% of olive oil soap, then rinsed and finally soured (4% muriatic or a corresponding amount of acetic acid). In order to whiten the material, the silk may be bleached by sulphuring or in a slightly alkaline bath of peroxide of hydrogen; a treatment with phosphate of tin is used only with Dianil and a few other dyestuffs.

Notes on Processes, New Colors, etc.

Almost all colors, with the exception of indigo and sulphur dye-stuffs, can be used for direct printing on silk, and they may be fixed without further assistants. Basic colors may be used without tannin, and certain mordant colors may be fixed without mordants; but in order to enhance the fastness to water and washing, either tannin or metallic salts are employed.

It is important to dissolve the colors properly and select the most advantageous thickening to produce even results. Thickenings and mordants have also great influence upon the feel of silk. A surplus of mordant produces a harsh feel and certain thickening agents, like gum in the presence of chrome mordants, act detrimentally upon the lustre of the silk; additions of soap, oil, Turkey red oil, etc., to the printing pastes must also be avoided.

The most general thickening ingredient is gum; for light colors Gum Senegal is the most advantageous.

White and yellow dextrines, also British gum and tragacanth may be used, the tragacanth-starch thickening, however, is less frequently employed, as it requires much more washing; the same applies to certain British gums containing starch; and since many thickenings are liable to produce dull effects, it is advisable to always make trials with these thickenings first to ascertain their suitability for the required purpose.

The thickening has also an influence upon the depth of the shade. British gum yields the darkest shades, for medium British gum, dextrine yellow and white or mixtures are used; for light shades Gum Senegal, yellow dextrine and burnt starch are preferable. The alizarine colors, fixed with chromium acetate, may be thickened with any of the above with the exception of gum, which tends to make the handle harsh; the tragacanth thickening may be used for all colors with the exception of those that require chrome mordants.

The thickenings are either stirred into the color solution, or the dextrine, burnt starch or British gum are added to the color and the whole heated until the thickening is properly dissolved.

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The latter method is advantageous for colors which dissolve with difficulty. For 1000 parts of printing paste are used:

For Light Shades.....540 parts Yellow Dextrine

For Medium Shades.....280 parts Yellow Dextrine and
200 parts White Dextrine

For Dark Shades.....250 parts British Gum

In preparing printing pastes ammonia is often added in order to keep certain colors (Patent Blue, Acid Violet, Silk Wool Black, Eosine, Chinoline Yellow, Nigrosine, etc.), better in solution. After printing, the silk is steamed for one-half hour in moist steam. Tannin colors are then passed through an antimony bath and washed. Pastes containing starch are washed in a lukewarm Diastafor bath in order to soften the material. Since many of the colors fixed on silk are fairly fast to soap, the goods are generally soaped after printing.

In order to improve the handle, the goods are soured after rinsing.

FOR BASIC COLORS.

20 parts Dyestuff

100 parts Acetic Acid 12° Tw..

600 parts Senegal Gum 1:1

20 parts Tartar Acid

40 parts Acetic Acid Tannin Solution 1:1

220 parts Water

1000 parts

FOR ACID COLORS, INCLUDING RESORCINE COLORS.

20— 40 parts Dyestuff

330—310 parts Water

600 parts Senegal Gum 1:1

30 parts Glycerine

20 parts Tartaric Acid

1000 parts

Notes on Processes, New Colors, etc.

FOR ACID ALIZARINE COLORS.

80 parts Dyestuff
480 parts Water
200 parts British Gum
30 parts Glycerine
50 parts Acetic Acid 50%
40 parts Sulphuric Acid 168½° Tw. 1:1
100 parts Fluoride of Chrome 4:1
15 parts Chlorate of Soda 1:3
5 parts Sulphocyanide of Ammonia 1:10

1000 parts

AMIDO FAST BLACK.

A	{	60 parts Amido Black Base
		150 parts Acetic Acid 90° Tw. and stir into
		480 parts Wheat Starch Tragacanth Thickening
		150 parts Water
B	{	33 parts Hydrochloric Acid 32° Tw.
		13 parts Chloride of Alumina 52.5° Tw.
		20 parts Chloride of Chrome 52.5° Tw.
C	{	4 parts Chloride of Copper 76° Tw.
		30 parts Chlorate of Soda dissolved in
		60 parts Water

1000 parts

Before use add B and C to A while stirring. Steam in the Mather-Platt for two minutes at 212° F., soap and wash.

WHEAT STARCH TRAGACANTH THICKENING.

225 parts Wheat Starch
600 parts Water
2100 parts Tragacanth 60:1000
Boil ½ hour.

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FOR PATENT BLUES.

30 parts Dyestuff
170 parts Water
50 parts Ammonia
700 parts Gomme Industrielle 1:2
30 parts Glycerine
20 parts Tartaric Acid

1000 parts

FOR DIANIL COLORS.

30-40 parts Dyestuff
400 parts Water
500 parts Gum Senegal 1:1
30 parts Phosphate of Soda
30 parts Glycerine

1000 parts

FOR DIANIL BLACKS.

60 parts Dyestuff
670 parts Water
200 parts British Gum
30 parts Glycerine
40 parts Phosphate of Soda

1000 parts

FOR JANUS COLORS.

20-40 parts Dyestuff
50 parts Acetic Acid 50%
50 parts Lactic Acid 50%
335 parts Water
230 parts Dextrine (yellow)
200 parts Dextrine (white)
30 parts Glycerine
10 parts Tartaric Acid
5 parts Chlorate of Soda

1000 parts

Notes on Processes, New Colors, etc.

FOR SOLUBLE ALIZARINE COLORS.

30 parts	Dyestuff
270 parts	Water
280 parts	Dextrine (yellow)
200 parts	Dextrine (white)
30 parts	Glycerine
40 parts	Formic Acid conc.
150 parts	Acetate of Chrome 32½° Tw. (green)
<hr/>	
1000 parts	

FOR OXAZINE COLORS.

75-300 parts	Dyestuff
345- 20 parts	Water
280 parts	Dextrine (yellow)
200 parts	Dextrine (white)
30 parts	Glycerine
20 parts	Formic Acid conc.
150 parts	Acetate of Chrome 32½° Tw. (green)
<hr/>	
1000 parts	

AMIDO FAST BLACK FOR YARN PRINTING.

Preparation of Yarn.—The yarn is boiled out with water for about four hours under a pressure of 45-60 pounds. A soda boil is not advisable as with this the patterns are likely to run.

After boiling out, the yarn is bleached from three to four hours with a dilute solution of chloride of lime until it is a satisfactory white. It is then washed several times in cold and hot water, and then allowed to lie two hours in a weak ammonia bath (2 lbs. of ammonia to 100 lbs. yarn); then it is well washed at 80° F.

After washing, the yarn is run through a size of 2 pounds of wheat starch and 1 pound of dextrine in 100 gallons of water, extracted and dried.

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Printing.—The yarn must be thoroughly dried, and with patterns that run easily it is advantageous to warm before printing. After printing, the yarn should be hung in a warm dry-room at 105° F. until it is black; which requires several hours. It is well to leave the yarn over night in the dry-room.

After the black is completely developed, it is fixed somewhat better if it is steamed without pressure for about 15 minutes. This steaming is necessary in all cases where the color is required to stand boiling acid.

While it is not absolutely necessary to wash the prints they can be finished by washing and soaping, as usual.

The Amido Fast Black is fast to washing, soap, soda, alkali and light; and does not injure the fibre and will not turn green.

PRINT COLORS FOR THE ENGLISH OR IRON MACHINE.

Stock Liquor A.

- 240 parts Starch Thickening
- 100 parts Tragacanth 6-100
are mixed with
- 30 parts Amido Black Base
dissolved in
- 100 parts Acetic Acid 80° Bé
- 35 parts Lactic Acid 50%

Stock Liquor B.

- 240 parts Starch Thickening
- 100 parts Tragacanth 6-100
- 14 parts Chloride of Alumina 30° Bé
- 2 parts Copper Chloride 40 Bé
are added to cold solution of
- 25 grams Sodium Chlorate
dissolved in
- 100 parts Hot Water

Before using, the stock liquors A and B are mixed and made up to 1000 parts and strained.

Notes on Processes, New Colors, etc.

STARCH THICKENING.

200 parts Wheat Starch
800 parts Water
200 parts Acetic Acid 6° Bé
are boiled together and made up to 1000 parts.

FOR PRINTING ON MANGLE.

Stock Liquor No. 1.

21 parts Wheat Starch in
350 parts Water
are boiled well together and cooled.
30 parts Amido Black Base are dissolved in
100 parts Acetic Acid 8° Bé
35 parts Lactic Acid 50%

When cool, this is mixed with the starch paste.

Stock Liquor No. 2.

14 parts Chloride of Alumina 30° Bé
2 parts Chloride 40° Bé
400 parts Water
25 parts Sodium Chlorate
dissolve in

100 parts of hot water and cool.

Before using, mix Stock Liquor No. 2 with Stock Liquor No. 1 and make up to 1000 parts and strain.

COMBINATION OF RESISTS UNDER DISCHARGES WITH HYDROSULPHITE NF CONC. HOECHST PAT. ON AZO COLORS.

This method of printing coincident resists and discharges is especially recommended for Para Reds and Para Browns as the effects are much more brilliant than by the ordinary methods.

For the resists, acid oxidizing reagents are used and antimony salts are added so that the hydrosulphite discharge colors can be prepared with ordinary basic colors.

The usual agents are non-volatile organic acids, as for example,

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citric or tartaric acid; and with them can be used chlorates, persulphates, chromates and any oxidizing metal salts, as copper salts or ferric salts; but the best results are obtained with citric or tartaric acid in combination with sodium chlorate.

It is especially useful with Para Reds as the shade is not altered. With Para Browns the results obtained with alkaline copper solution are very good.

Chrome colors which require oxidation for developing, such as Chromoglaucine and Philochromine are suitable for use with the acid chlorate resist.

The goods after printing are thoroughly dried, then steamed in a Mather-Platt at 212-215° for two to three minutes, and then the goods are finished in the usual way.

In the preparation of the resist and discharge pastes, the following formulas give good results:

NF WHITE RESIST FOR PARA RED AND PARA BROWN.

84 parts Gum Water
6 parts Citric Acid cryst.
10 parts Sodium Chlorate

100

NF YELLOW RESIST FOR PARA BROWN.

40 parts Dextrine Thickening 1-1
20 parts Caustic Acid Solution 40° B_é
Warm, then cool and slowly stir in:
40 parts Alkaline Copper Solution

NF YELLOW RESIST FOR METHYLENE YELLOW H OR AURAMINE DISCHARGE.

50 parts Gum Water
10 parts Citric Acid cryst.
20 parts Tartar Emetic
20 parts Sodium Chlorate

100

Notes on Processes, New Colors, etc.

NF RESIST FOR CHROMOGLAUCINE, PHILOCHROMINE, ETC.

- 50 parts Gum Water
- 20 parts Citric Acid cryst.
- 20 parts Sodium Chlorate

DISCHARGE WHITE NF.

- 60 parts Gum Water
- 15 parts Hydrosulphite NF conc. Hoechst pat.
- 25 parts Water

DISCHARGE YELLOW NF.

- 20 parts Auramine
- 30 parts Acetine
- 10 parts Glycerine
- 155 parts Hot Water are mixed together with
- 400 parts Thickening for Color Discharge
- Warm until dissolved and then add
- 60 parts Carbolie Acid
- 80 parts Tannin Solution 1-1 in water.
- When cold, stir in solution of
- 170 parts Hydrosulphite NF conc. Hoechst pat.
- 60 parts Water
- 5 parts Formaldehyde 40%
- In place of Auramine conc. an equal amount of Methylene Yellow H can be used.

DISCHARGE BLUE VM.

- 5 parts Chromoglaucine VM Paste Pat.
- 45 parts Tragacanth 6-100
- 5 parts Green Chromium Acetate 20° Bé
- 45 parts Hydrosulphite Solution

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HYDROSULPHITE SOLUTION.

225 parts Hydrosulphite NF conc. Hoechst Pat.
750 parts Water
Dissolve in a water bath, cool, and add slowly
5 parts Formaldehyde 40%
20 parts Acetic Acid 50%
parts Water

THICKENING FOR DISCHARGE PASTE.

150 parts Wheat Starch
550 parts Water
300 parts Tragacanth 6-100

1000

Boil well together.

WHITE AND COLORED DISCHARGES ON ALPHA-NAPHTHYLAMINE CLARET.

(Process Patented.)

This new process which has been brought by the Farbwerke, Vorm. Meister, Lucius and Brüning, depends upon the use of Rodogen MLB Pat. as a previous preparation or addition to the hydrosulphite-discharge colors.

The first gives the best results and has the advantage that the same white and colored discharges can be used for Paranitraniline, Para Brown and one dip colors; and also for the Alphanaphthylamine Benzidine, thus avoiding the preparation of several different kinds of discharge pastes.

The goods must always be prepared previous to printing and when the dry material is used, about 20 to 30 parts of Rodogen MLB Pat., per thousand of water, are required. The treatment

Notes on Processes, New Colors, etc.

can also be applied to the material after dyeing and soaping; but with wet goods, correspondingly more—that is, 30 to 40 parts per thousand water will be necessary. Also, dark shades made with Benzidine Base require up to 40 parts per thousand. The goods can also be prepared by padding first with Rodogen, and then passing through an alkaline bath (carbonate or caustic soda).

After the Rodogen preparation, the goods are dried and printed with the necessary discharge colors; then died again, steamed 3 to 5 minutes in a Mather-Platt; or 10 minutes in a steam box at 215° F. They are then run through an antimony bath, soaped, washed and dried.

The same method as used for Alphanaphthylamine Claret can be used for Benzidine, Tolidine, Chloranisidine, Nitrophenetidine, Azophor Black S, DP, and Azophor Rose BB.

The formulas follow:

WHITE DISCHARGE (NO. 1) FOR SINGLE COLOR PRINT.

200 parts Hydrosulphite NF Conc.

200 parts Gum Solution 1-2

Dissolve and stir in

600 parts Thickening WT 1-1

6 parts Ultramarine

WHITE DISCHARGE (NO. 2) FOR MULTICOLOR PRINT.

300 parts Hydrosulphite NF Conc.

300 parts Gum Solution 1-2

Dissolve and stir in

400 parts Thickening WT 1-1 and

6 parts Ultramarine

THICKENING WT.

225 parts Wheat Starch

600 parts Water

2100 parts Tragacanth 60-1000

Boil together for one-half hour.

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REDUCING PASTE.

150 parts Hydrosulphite NF Conc.
200 parts Gum Solution 1-2
500 parts Thickening WT
100 parts Water
25 parts Aqueous Tannin Solution 1-1
25 parts Glycerine

YELLOW DISCHARGE.

30 parts Auramine
260 parts Water
30 parts Glycerine
240 parts Thickening WT
10 parts Acetine

Warm until dissolved, then cool and add:

60 parts Carbolic Acid
100 parts Aqueous Tannin Solution 1-1

When cold, add a solution of

170 parts Hydrosulphite NF Conc. in 100 water.

BLUE DISCHARGE GO.

Make up the same as Yellow, except use:

20 parts Thionine Blue instead of Auramine and
150 parts Hydrosulphite in place of 170

ORANGE DISCHARGE R.

Use 30 parts of Flavophosphine R Conc. new, instead of Auramine, the other proportions being the same.

ORANGE DISCHARGE G.

Use 30 parts of Flavophosphine G Conc. new, instead of Auramine, the other proportions being the same.

RED DISCHARGE.

Use 20 parts of Rhodamine 6G extra, in place of Auramine with the other proportions.

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PINK DISCHARGE.

28 parts Red Discharge
2 parts Yellow Discharge
70 parts Reducing Paste

HELIOTROPE DISCHARGE.

21 parts Red Discharge
4 parts Blue Discharge GO
75 parts Reducing Paste

VIOLET DISCHARGE

40 parts Red Discharge
60 parts Blue Discharge GO

YELLOW GREEN DISCHARGE.

80 parts Yellow Discharge
20 parts Blue Discharge GO

GREEN DISCHARGE.

66 parts Yellow Discharge
34 parts Blue Discharge GO

OLIVE DISCHARGE.

75 parts Orange Discharge R
25 parts Blue Discharge GO

LIGHT BLUE DISCHARGE.

25 parts Blue Discharge GO
75 parts Reducing Paste

BLUE DISCHARGE VM (DARK BLUE).

50 parts Chromoglaucine VM 40%
250 parts Water

Rub up with:

400 parts Thickening WT

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50 parts Green Chromium Acetate
Then add:
150 parts Hydrosulphite NF Conc.
Dissolve in 100 parts water.

THE FIRST SULPHUR RED.

As before noted in this journal, the Farbwerke vorm. Meister Lucius & Bruening, Hoechst-on-the-Main, have brought out bright sulphur violets which are Thiogene Violets V and B and Thiogene Heliotrope O. They now have brought out the first Sulphur Red under the name of Thiogene Rubine O. This is a blue shade of red with the same fastness to washing as the Thiogene Violet B, but its fastness to light is appreciably better. This new dyestuff is suitable for all kinds of cotton dyeing. It is dyed in a Sodium Sulphite bath with or without the addition of common salt and Soda. On account of its solubility it can be used in all kinds of dyeing machines.

The shades are fast to washing, fulling, light, soda and acid, but the resistance to chlorine bleach is small, like that of the other colors of this group.

When treated with copper sulphate, Thiogene Rubine O gives a violet shade which approaches that of Thiogene Violet V, but the fastness is considerably better, being equal to that of Alizarine Violet with the exception of its resistance to chlorine.

These fast violet and lilac shades are particularly recommended where great fastness is desired. As these shades can also be discharged with chlorates, they should be very interesting to calico printers.—(*Revue Generale des Matieres Colorantes.*)

THIOGENE BLUES R AND RR.

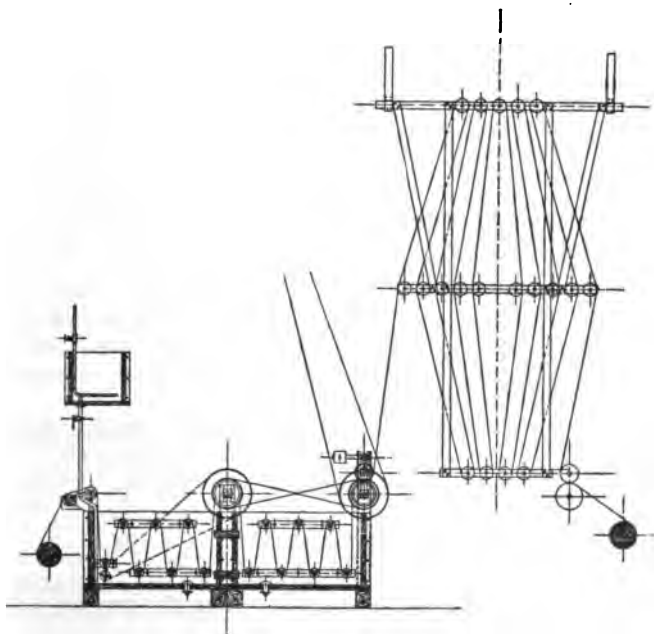
These new products are similar to Thiogene Blue B in their properties but the shades are somewhat redder, the 2R being the reddest.

The dyestuff is dissolved with sodium sulphide in boiling water

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and this solution added to the dye bath containing soda and salt and glucose. The dyeing is continued for 1 hour at about 160° to 190° F. After dyeing, the excess of dye liquor is removed from the goods by squeezing or extracting and the color developed by smothering or oxidizing in the air.

For the dyeing of piece-goods in large quantities, it is advisable to use a box with rollers connected with an oxidizing arrangement and a washing machine. The arrangement is shown in the sketch.



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If the goods are washed immediately after dyeing, the result is somewhat faster but the shade somewhat greener and duller.

Raw cotton or yarn is dyed in machines or in other kettles, the material being kept under the liquor.

About 600 yards of goods can be dyed per hour in a vat containing about 375 gallons. For dyeing smaller quantities, a jigger connected with a suitable oxidizing apparatus should be employed. In this case the goods should have 2 or 3 runs, and in order to obtain a clear list the goods should be thoroughly squeezed after each passage and then oxidized.

First bath for the above box with rollers and containing about 375 gallons.

Dyestuff	10 lbs.
Sodium Sulphide Cryst.	20 lbs.
Glucose	2 lbs.
Caustic Soda 77° Tw.	2 lbs.
Sodium Carbonate dry.....	1½ lbs.

The above quantities are to be considered as remaining in the dye bath, and the amount of color used in dyeing should be added by means of a feeding liquor which contains the same proportions as the first bath but is more concentrated, and its addition is regulated according to the weight of the goods and the rapidity of the passage through the dye liquor, in such a way that the amount of dye and the strength of the dyestuff remain constant.

Proportions for 100 lbs. yarn in kettle:

	1st Bath.	2d and Following Baths.
Dyestuff	15 lbs.	7½ lbs.
Sodium Sulphide Cryst.	30 lbs.	15 lbs.
Glucose	8 lbs.	4 lbs.
Calcined Soda.....	6 lbs.	2 lbs.
Common Salt.....	10 lbs.	

These colors can be combined with the other Thiogene colors for the production of compound shades, especially various shades of blue.

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THIOGENE GREENS—B, BL EXTRA, GG, AND GL EXTRA.

This group of colors is a valuable addition to the Thiogenes and is of great advantage on account of the range of shades which can be obtained from them either alone or in combination with the other Thiogene colors.

These are dyed as usual in a sodium sulphide bath with the addition of salt and sodium carbonate.

The usual proportions are:

	1st Kettle.	2nd.	Standing.
Thiogene Green B.....	10 lbs.	8 lbs.	7½ lbs.
Sodium Sulphide Cryst.	15 lbs.	8 lbs.	7½ lbs.
Sodium Carbonate dry.....	5 lbs.	3 lbs.	1½ lbs.
Salt	30 lbs.	10 lbs.	5 lbs.
Thiogene Green GG.....	10 lbs.	8 lbs.	7½ lbs.
Sodium Sulphide Cryst.....	20 lbs.	12 lbs.	11 lbs.
Sodium Carbonate dry.....	5 lbs.	3 lbs.	1½ lbs.
Salt	30 lbs.	10 lbs.	5 lbs.
Thiogene BL extra.....	10 lbs.	8 lbs.	6 lbs.
Sodium Sulphide Cryst.....	7 lbs.	5 lbs.	4 lbs.
Sodium Carbonate dry.....	5 lbs.	3 lbs.	1½ lbs.
Salt	30 lbs.	10 lbs.	5 lbs.
Thiogene Green GL extra....	10 lbs.	8 lbs.	6 lbs.
Sodium Sulphide Cryst.	10 lbs.	8 lbs.	6 lbs.
Sodium Carbonate dry	5 lbs.	3 lbs.	1½ lbs.
Salt	30 lbs.	10 lbs.	5 lbs.

Like all Thiogene colors, a perfect solution must be made with these before adding to the dyebath. This is most readily done by dissolving the dyestuff and sodium sulphide together in boiling water and then adding to the dyebath which contains the sodium carbonate and salt in solution.

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The proper temperature for dyeing is from 180° to 200° F. and the operation is continued for about one hour. After dyeing the material is squeezed or extracted and thoroughly washed.

The usual aftertreatment with metallic salts has little effect on the fastness, the marks B and GG are much improved by an after-treatment with sodium thiosulphate. With this method the material is washed after dyeing, and then passed through a solution of sodium thiosulphate, 2 parts to 1000 of water, and dried without washing.

THIOGENE BROWN 2R.

This is similar to Thiogene Brown R but gives a somewhat redder shade. It is dyed in the same way and can be used either alone or in combination with the other Thiogene colors.

For solution, it requires half the amount of dyestuff of sodium sulphide crystals. The usual additions of soda and salt are made to the dye bath.

The material is dyed for about one hour at about 190–200°, and then immediately well washed. Aftertreatment with copper or copper and chrome makes the shade somewhat darker and increases the fastness to boiling soda and also to light.

The dyeings made with this color possesses all the advantageous properties of the Thiogene group.

THIOGENE CYANINE G.

This Thiogene color is especially recommended on account of the brightness of the shade and its comparative fastness to chlorine.

This requires for solution twice the amount of sodium sulphide crystals as dyestuff, with the usual addition of soda and salt to the dye bath.

The bath oxidizes so slowly that the yarn can be dyed in the

Notes on Processes, New Colors, etc.

ordinary method without sinking completely under the liquor. The piece goods can be dyed either in the jigger or by padding. When the padding method is used the shades are somewhat redder.

This color is recommended for light and medium blues, and also for shading the heavier marks of blue where the greener shades are required.

The fastness to chlorine is practically the same as indigo; the shades becoming somewhat lighter with this treatment but retaining the blue tone.

The fastness to washing, light, and acid is very good.

THIOGENE CYANINE O.

This is similar to the above and possesses all the properties, but gives shades that are brighter and a trifle more red in tone.

THIOGENE CATECHU R.

This new Thiogene color, while resembling the Thiogene Browns in general characteristics, is materially redder in shade and in combination with them can be used for the production of the ordinary cutch browns. The fastness of the shades made in this way is equal to those from the natural cutch.

Like the other members of this group it is dyed in an alkaline bath containing sodium sulphide and salt. For proper solution this dyestuff requires one and one-half times its weight of sodium sulphide crystals. The proportions of the other materials are as usual. The methods of dyeing for the various kinds of material are the same as with the Thiogene Browns. Yarn may be dyed above the liquor without bronzing and in jigger dyeing, the lists remain clear.

An after-treatment with copper sulphate or with copper sulphate and bichromate darkens the shade without its losing the reddish cast, but is not necessary unless great fastness to boiling soda is required.

It will give clear whites with chlorate discharge.

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THIOGENE BLACK BR CONC.

This black is a concentrated color of the same strength and properties as the former Thiogene Blacks. In shade it is between Thiogene Black MR and 2B.

The method of dyeing is exactly the same as for the other marks. The proportions for 100 pounds of yarn or loose cotton are:

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	12 lbs.	9½ lbs.	7 lbs.
Sodium Sulphide cryst..	36 lbs.	19 lbs.	14 lbs.
Sodium Carbonate dry..	10 lbs.	3 lbs.	2 lbs.
Salt	50 lbs.	10 lbs.	3 lbs.

The proportion of dye-bath to material is 20-1.

PIECE GOODS ON JIGGER.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	11 lbs.	9 lbs.	6 lbs.
Sodium Sulphide cryst..	33 lbs.	18 lbs.	12 lbs.
Sodium Carbonate dry..	51 lbs.	3 lbs.	1 lb.
Glauber's Salt cryst....	10 lbs.	3 lbs.	1 lb.

The above proportions are for 100 pounds of material.

In dyeing mercerized goods 25% less dyestuff is required.

THIOGENE BLACK LIQUIDS.

As the first essential in dyeing sulphur colors is the proper solution of the dyestuff, the Farbwerke vorm. Meister Lucius & Bruening, realizing this, have placed on the market several of their Thiogene Blacks in liquid form. These contain the dyestuff as a leuco compound in a very concentrated solution.

The first of this series is Thiogene Black M conc. This is a 50% solution of the leuco compound of Thiogene Black M conc. The solution being perfect, it requires no sodium sulphide to dissolve it, only a sufficient amount being added to keep the dye-bath in proper condition.

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The Thiogene Black M Liquid is added directly to the dyebath, which has been previously prepared with the necessary assistants.

PROPORTIONS FOR VARIOUS MATERIALS.

Method of handling being the same as for powders.

For 100 lbs. material.

YARN IN KETTLE.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	22 lbs.	16 lbs.	13 lbs.
Sodium Sulphide cryst....	10 lbs.	5½ lbs.	4½ lbs.
Sodium Carbonate dry...	10 lbs.	3 lbs.	2 lbs.
Salt	50 lbs.	15 lbs.	3 lbs.

RAW COTTON IN OPEN TUB.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	18 lbs.	14 lbs.	11 lbs.
Sodium Sulphide cryst..	9 lbs.	5 lbs.	3½ lbs.
Sodium Carbonate dry..	9 lbs.	4 lbs.	2 lbs.
Salt	50 lbs.	15 lbs.	3 lbs.

PIECE GOODS IN JIGGER.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	20 lbs.	15 lbs.	11 lbs.
Sodium Sulphide cryst..	10 lbs.	5 lbs.	3½ lbs.
Sodium Carbonate dry..	6 lbs.	4 lbs.	2 lbs.

Salt is usually omitted in jigger dyeing.

THIOGENE BLACK BB LIQUID—THIOGENE BLACK BR LIQUID.

These are similar products to Thiogene Black M Liquid and are handled in the same way. These differ only in shade corresponding to the same marks in powder form.

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The usual proportions follow for 100 lbs. material:

YARN IN KETTLE.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	25 lbs.	20 lbs.	15 lbs.
Sodium Sulphide cryst..	12½ lbs.	7½ lbs.	6 lbs.
Sodium Carbonate dry..	10 lbs.	3 lbs.	2 lbs.
Salt	50 lbs.	15 lbs.	3 lbs.

PIECE GOODS ON JIGGER.

	1st Bath.	2d Bath.	Standing Bath.
Dyestuff	20 lbs.	16 lbs.	12 lbs.
Sodium Sulphide cryst..	10 lbs.	6 lbs.	4½ lbs.
Sodium Carbonate dry..	6 lbs.	4 lbs.	2 lbs.
Thiogene Oil	2 lbs.	1 lb.	1 lb.

The addition of oil is generally beneficial.

Mercerized goods will require only 75-80% of the above quantities.

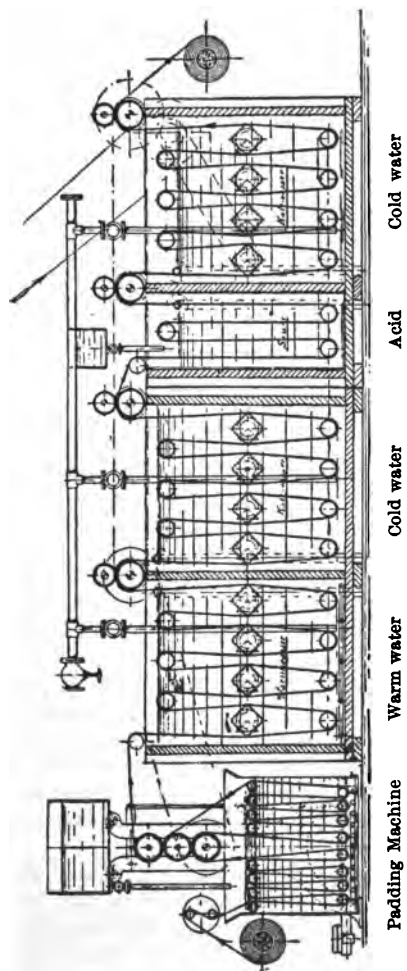
THIOGENE BLACK M PADDING LIQUID.

This is a 50 per cent. solution of Thiogene Black M conc., which is especially suited for use in padding machines. This method of dyeing is especially recommended for the production of Black, as the pieces in many cases can be taken directly from the bale and dyed without previous boiling out.

For dyeing sulphur colors in this way, the machine as shown in the cut is especially adapted for economical working and satisfactory results.

The goods pass through the boiling dye liquor, the latter being kept at a permanent level by a supply from an elevated tank. The padding machine, which gives the pieces two squeezes, has the pressure regulated so the goods take up from 65-85% of liquor; and the speed should be arranged that the goods are in the dye-bath 30-60 seconds. The dye-box should contain 100 gallons of dyebath, the latter being heated by means of a steam coil.

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In working with very heavy goods, it is well to arrange another squeeze below the surface of the bath so that the goods may be thoroughly penetrated.

After padding, the pieces are run into an open washer with several boxes, arranged as shown in the cut. In working by this method it is essential that the goods should be thoroughly washed after dyeing.

The padding liquors are usually made up in a proportion for:

12 gal. of water

15 lbs. Thiogene Black M Padding Liquor

7½ lbs. Sodium Sulphide crystals

6 lbs. Caustic Soda Solution 77° Tw.

Addition of oil may also be found of use.

THIOGENE COLORS IN PRINTING.

DIRECT PRINTING.—In this method of application the colors are fixed by means of reducing agents in the presence of caustic alkali; the latter is more advantageous than the carbonate. It is necessary to use an excess of reducing agent in order to obtain the full effect in steaming. Hydrosulphite NF conc. Hoechst is especially to be recommended for this purpose, as in the cold it is only slightly acted upon by alkalies, while its full effect is obtained on steaming.

All sulphur colors containing free sulphur or polysulphides will blacken copper or be injuriously affected by copper. To avoid this defect it is necessary to use such colors as are free from sulphur or the printing pastes must be prepared with the addition of a bisulphite. This converts the polysulphides into thiosulphates which are without injurious effect. The practical method of working is as follows:

The color is properly dissolved with water and soda lye on the water-bath (very concentrated colors may be dissolved with alkaline thickening). After cooling and thickening with alkaline paste, the cold Hydrosulphite NF conc. Hoechst solution is added

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and finally—if required—the bisulphite stirred into the printing paste.

After printing, the pieces are well dried and then steamed in the Mather-Platt quick-steaming apparatus (which must be free from air) at 212°–215° F. Dark shades are developed in 9 min., light shades require about 3 min. exposure to strong steam.

The goods are washed after steaming and finally soaped in the open washing machine.

For very dark shades it is advisable to add some oil of vitriol (5 in 1000 parts cold water) to the first box; for Thiogene Blue the addition of some bichromate is advantageous.

These additions prevent the colors from bleeding into white.

The following are examples of way of making up the printing pastes:

BROWN PRINTING PASTE.

50 parts Thiogene Brown S
10 parts Soda lye 40° Bé.
140 parts Water
100 parts Alkaline Thickening
are heated on the water-bath; to the warm paste
are added:
25 parts Hydrosulphite NF conc. Hoechst dissolved in
30 parts Water and
580 parts Alkaline Thickening
Finally, when cold:
65 parts Sodium Bisulphite 30° Bé. are mixed into the
printing color.

1000 parts

After printing and drying, the goods are steamed three times each for 3 min. in the Mather-Platt at 215°–217° F. They pass then at full width through an acid bath (5 parts oil of vitriol per 1000 parts water) and are finally washed and soaped.

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GREY PRINTING PASTE.

- 5 parts Thiogene Diamond Black B
- 345 parts Water
- 10 parts Soda lye 40° Bé.
 - are heated on the water-bath; to the warm solution are added:
- 5 parts Hydrosulphite NF conc. Hoechst dissolved in
- 9 parts Water and
- 400 parts Alkaline Thickening
- 200 parts British Gum Thickening 1:1
 - Finally, when cold:
- 6 parts Sodium Bisulphite 30° Bé. are mixed into the printing color.

1000 parts

BLACK PRINTING PASTE.

- 100 parts Thiogene Black BB conc.
- 100 parts Soda lye 40° Bé.
- 100 parts Water
- 100 parts Alkaline Thickening
 - are heated on the water-bath; to the warm paste are added:
- 50 parts Hydrosulphite NF conc. Hoechst dissolved in
- 65 parts Water and
- 425 parts Alkaline Thickening
 - Finally, when cold:
- 60 parts Sodium Bisulphite 30° Bé. are mixed into the printing color.

1000 parts

After printing and drying, the pieces are steamed for 3 min. in the Mather-Platt at 215° to 217° F., then washed and soaped.

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BLUE PRINTING PASTE.

40 parts Thiogene Blue B
30 parts Soda lye 40° Bé.
130 parts Water
100 parts Alkaline Thickening
are heated on the water-bath; to the warm paste
are added:
20 parts Hydrosulphite NF conc. Hoechst dissolved in
30 parts Water and
590 parts Alkaline Thickening
Finally, when cold:
60 parts Sodium Bisulphite 30° Bé. are mixed into the
printing color.

1000 parts

After printing and drying, the goods are steamed 3 times each,
for 3 min., in the Mather-Platt at 215°-217° F., then passed
full width through a solution of

5 parts Bichromate
5 parts Oil of Vitriol
per 1000 water at 105° F., then washed well and finally soaped.

ALKALINE THICKENING.

125 parts British Gum
875 parts Soda lye 40° Bé.
are dissolved on the water-bath to make

1000 parts

DISCHARGE PRINTING.

The Thiogene Colors are best discharged with chlorate dis-
charges. Although none of Thiogene Colors resist the action of

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chlorine, very strong chlorate discharges are required for producing good discharge prints on them. This naturally increases the danger of tendering the fibre, and for that reason only thicker materials are suitable for these discharge styles, which are produced in light designs by means of alumina chlorate discharges.

Light shades may be discharged with the ordinary chlorate discharge, employed for Indigo prints, without tendering the fibre materially. In order to obtain clear effects, the dyed pieces are first soured with acetic acid, rinsed and dried, and then printed. After printing they are well dried (not too rapidly) and then steamed at once for 3 min. in the Mather-Platt at 212° F. This steaming operation must be repeated, if the discharges do not take thorough effect during the first passage through the steaming chamber.

Since sulphur colors are affected by chlorine it is necessary to provide the steamer with a ventilator for getting rid of all chlorine vapors.

After steaming, the goods are passed through diluted soda lye, then washed and soaped.

For colored discharges, chlorate-resisting pigments are used and they are fixed with albumen: Chrome Yellow, Guignet Green, Red Lake, Vermillion.

Following are the formulas for the discharge pastes:

DISCHARGE WHITE FOR HEAVY MATERIAL.

225 parts British Gum
575 parts Chlorate of Alumina 25° Bé., are heated on the water-bath, and
150 parts Chlorate of Soda (powdered) added. When cold
50 parts Red Prussiate are mixed into it.

1000 parts

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CHLORATE OF ALUMINA 25° BÉ.

1 { 200 parts Sulphate of Alumina
130 parts Water
dissolved hot.

2 { 300 parts Chlorate of Barium
350 parts Water.

1 and 2 are mixed, cooled, the clear liquid decanted and made up with water to 25° BÉ.

COLORED DISCHARGES ARE PREPARED WITH

350 parts Lake (Chrome Yellow, Guignet's Green, Red Lake, etc.)

475 parts Discharge White

150 parts Albumen 1:1

25 parts Citrate of Ammonia

1000 parts

These pastes are printed upon previously white-discharged and soaped material; the goods are then dried and steamed in the Mather-Platt or in the steam-box. They need not be washed; they may however be passed at full width through water and are then dried over cylinders.

DISCHARGE WHITE FOR LIGHT MATERIAL.

375 parts Thickening WT

200 parts Sodium Chlorate

are dissolved on the water-bath; then

100 parts China Clay,

75 parts Water

100 parts Citric Acid

100 parts Water

are added, and when cold

50 parts Yellow Prussiate stirred into the printing paste.

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THICKENING WT.

250 parts Wheat Starch

600 parts Water

2600 parts Tragacanth 60:1000

boiled together for $\frac{1}{2}$ h.

After printing, the pieces are dried (not too rapidly) and finally steamed for about 5 min. in the Mather-Platt at 212° F. If the discharge effect is not sufficiently developed, the goods are again steamed in the closed box for $\frac{1}{2}$ hour without pressure.

After steaming, the pieces are passed at full width through a bath containing 5 parts Soda lye 40° Bé. per 1000 parts at 120°–130° F., and finally soaped for 5 min. at the boil.

CHROMOGLAUCINE BMJ Pat.

SOLUTION AND POWDER.

This belongs to the same group as the Chromoglaucine VM Paste patented. This product gives shades in combination with chrome mordant which are similar to Alizarine Blue and are of very good fastness.

The relative strength of the Chromoglaucine BMJ solution is equal to 15% of the powder. As this color will withstand the action of reducing agents it can be used in combination with hydrosulphite discharge pastes, and also can be discharged to pure whites with the usual chlorate discharge.

In making up the printing pastes it is advisable to use green Chromium Acetate.

In steaming, about 5–10 minutes in a Mather-Platt machine is all that is required; but a longer steaming is not injurious unless excessive pressure is used when the shades become redder. The printing pastes are very stable.

For shading this color Chromoglaucine VM is recommended as it is similar in constitution and the method of using is exactly the same.

It can be padded or printed on either bleached or prepared

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goods and gives very good results. The fastness to washing, soaping, light and chlorine is equal to the best colors used in calico printing.

It can be used for direct printing or as a padding color which can be discharged with chlorate discharge, and can be used with Hydrosulphite NF conc. Hoechst pat. as a colored discharge on azo colors, etc.

The following formulas have been found to give good results:

PADDING LIQUOR.

- 200 parts Chromoglaucine BMJ solution
- 500 parts Water
- 2 parts Hydrosulphite NF conc.
- 50 parts Tragacanth 6-100
- 15 parts Formic Acid conc.
- 15 parts Glycerine
- 100 parts Water
- 80 parts Chromium Acetate 20° B_é

1000

The goods are dried on the hot flue, printed as desired, and steamed for six minutes in a Mather Platt and then washed and soaped.

CHLORATE DISCHARGE FOR WHITE.

- 75 parts China Clay should be made into paste with
- 75 parts Water
- 200 parts Gum Water
- 140 parts Sodium Chlorate—add:
- 100 parts Powdered Tartaric Acid
- 50 parts Water
- 100 parts Gum Water 1-2
- 16 parts Blood Albumen
- 44 parts Gum Water 1-2

These materials are mixed together and made up to 1000.

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BLUE PRINTING COLOR.

- 30 parts Chromoglaucine BMJ powder
- 220 parts Water
- Dissolve and add to solution:
- 600 parts Wheat Starch Tragacanth Thickening
- 50 parts Formic Acid conc.
- 100 parts Chromium Acetate 20° Bé (green)

DISCHARGE BLUE PASTE.

- 200 parts Chromoglaucine BMJ Solution
 - 400 parts Wheat Starch Tragacanth Thickening
 - 50 parts Chromium Acetate 20° Bé. (green)
 - 250 parts Hydrosulphite Solution
 - 100 parts Water
-
- 1000

HYDROSULPHITE SOLUTION.

- 225 parts Hydrosulphite NF conc. Hoechst pat.
 - Dissolve in
 - 225 parts Water
 - Cool and add:
 - 5 parts Formaldehyde 40%
 - Add slowly:
 - 20 parts Acetic Acid in
 - 25 parts Water
-
- 500

After printing, the material should be dried moderately, steamed for 4 minutes in a Mather-Platt free from air at 212°-215° F., allowed to lie in the air until the leuco compounds have been oxidized; then washed and soaped.

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In running on a continuous machine it is recommended to develop the colors with a chrome bath.

PHILOCHROMINE B PASTE—PHILOCHROMINE G PASTE.

These two dyestuffs, belonging to the oxazine group, on account of their bright shades and satisfactory fastness, are suitable for the production of light and medium blues either by direct printing, padding, or drying upon chrome mordanted material.

The shades can be discharged with chlorate discharge and the dyestuffs can be combined with other chrome colors in making compound shades.

The shade of Philochromine B is somewhat redder and purer than that of G, but both give clear shades which are essentially faster to light than those produced by most pure blue basic dyestuffs. The fastness to washing, acid and soaping is also very good.

These colors are recommended where greater fastness is desired than can be obtained by the use of blue basic dyestuffs for making light and medium blues by any of the usual methods of application.

PRINT COLOR.

200 parts Dyestuff
272 parts Water
450 parts Thickening WT
28 parts Formic Acid 85%
50 parts Chromium Acetate (green)

PADDING LIQUOR.

200 parts Dyestuff
5000 parts Water
40 parts Chromium Acetate (green) make up to

6000

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CHLORATE DISCHARGE.

375 parts Thickening WT
200 parts Sodium Chlorate
Warm until dissolved, then add:
200 parts Kaolin Paste 1-1
50 parts Potassium Ferrocyanide
Before using add:
100 parts Citric Acid in
75 parts Water

THICKENING WT.

225 parts Wheat Starch
600 parts Water
2100 parts Gum Tragacanth 6-1000
Boil well together.

After printing, the goods are passed through a Mather-Platt quick steamer and then strained for one hour in an ordinary steam box. As the print color before development is sensitive to sulphurous acid and chlorine the presence of aniline black or bisulphite colors is to be avoided. After steaming, the goods are allowed to oxidize, best over night, washed and soaped. A passage through the usual chrome bath is beneficial. In padding for chlorate discharge the padded goods are dried and steamed one hour before printing. After printing they are steamed 2-3 minutes in a Mather-Platt at 212° F., allowed to oxidize, then washed and soaped. These dyestuffs can be combined with other chrome colors in the production of compound shades.

LANAGLAUCINE W PASTE PAT.

This new dyestuff is especially useful in wool printing, both as a direct color and as a discharge color in combination with tin salt or Hydrosulphite NF conc. Hoechst. In direct printing it gives dark-blue shades of excellent fastness, and as a discharge color is particularly recommended for combination styles with red.

The method of application is very simple, the combination of

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dyestuff and thickening being printed on chlored wool, steamed while damp without pressure, washed and dried. The addition of a mordant is not absolutely necessary but to obtain shades which are especially fast to washing it is advisable to add chromium fluoride and tartaric acid to the printing paste. In this case special care must be taken to wash the goods very thoroughly after steaming or pass through a cold soap bath so the material will retain its original softness and feel.

In direct printing this dyestuff can be combined with acid dyestuffs so any desired shade may be obtained. The best thickening for the pastes is the usual tragacanth British gum combination, the amount of glycerine depends on the condition of the steamer and the addition of chlorate is recommended as in the case of all dark colors for wool.

In discharge printing, the dyestuff is dissolved with acetine and then mixed with the necessary quantity of the discharge agent, either tin-salt or Hydrosulphite NF conc. Hoechst. The material is first dyed, then printed with the discharge color, aged, and steamed with moist steam. After steaming the discharge should be perfect and the goods are well washed. Care must be taken that neither the steam nor the material is too damp as the prints may bleed or the shade of the blue be tarnished by incomplete discharge of the bottom.

The pastes made as below give good results in practice.

PRINTING PASTE WITHOUT MORDANT.

150 parts Lanaglaucine W Paste

175 parts Water

475 parts Tragacanth 6-100

150 parts British Gum

20 parts Glycerine

Boil well together, cool and add

30 parts Sodium Chlorate Solution 1-3

1000 parts

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PRINTING PASTE WITH MORDANT.

- 150 parts Lanaglaucine W Paste
- 252 parts Water
- 375 parts Tragacanth 6-100
- 150 parts British Gum
- 20 parts Glycerine
- Boil well together and add cold
- 30 parts Sodium Chlorate Solution 1-3
- 10 parts Chromium Fluoride in
- 3 parts Water
- 10 parts Tartaric Acid

1000

Print on chlored wool, steam damp 1½ hours without pressure, wash well and dry.

BLUE DISCHARGE PASTE FOR AZO COLORS.

- 200 parts Lanaglaucine W Paste
- 250 parts Water
- 250 parts British Gum
- 100 parts Acetine
- Warm until dissolved, then cool and add
- 50 parts Tin Crystals (Stannous)
- 25 parts Oxalic Acid in
- 125 parts Water

1000

After printing, age 3 minutes in Mather-Platt and then steam 1 hour with moist steam. Then wash and dry, during which the leuco compounds are oxidized.

DIANIL FAST SCARLET 8BS.

This is a one dip color of a brilliant blue shade of red which is especially notable on account of its fastness to mineral acids. It is dyed in a boiling bath containing common salt and may be

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combined with the other Dianil colors for the production of compound shades.

In mixed goods, cotton and wool, also cotton and silk, it dyes the cotton darker than the other fibre and may be discharged to a clear white with Hydrosulphite N F.

It is particularly recommended for all kinds of cotton dyeing where fastness to acid is required.

FAST MORDANT BLUE B.

This new dyestuff is suitable for the production of fast blues on loose wool, slubbing, yarn and piece goods. Being easily and completely soluble, it can be used with any dyeing machine yielding level shades and good penetration. Only in special cases is any precaution necessary to obtain perfect results. It may be used alone or in combination with other mordant or chrome developed colors for the production of compound shades.

Methods of Dyeing as a Chrome Developed Color.—The dye bath is prepared with the necessary dyestuff, 20 per cent. Glauber's salt and 2-4% oil of vitriol. The goods are entered at 100°, worked slowly to boil and boiled one hour. When the bath is exhausted, it is cooled somewhat and the chrome, either in the form of Fluoride or Bichromate, added. Under ordinary circumstances, the required proportion is one-half the weight of the dyestuff; but with light shades it should be somewhat greater. The boiling is then continued for $\frac{3}{4}$ to 1 hour to fully develop the color.

With heavy material or certain varieties of coarse wool it is well to use, instead of oil of vitriol, a weaker acid, such as formic or acetic acid. With the use of these somewhat greener shades are obtained. When developed with chromium fluoride the dyeings are brighter and more violet than those with bichromate, the fluoride being principally used for piece goods.

On Chrome Mordant.—For this the usual Alizarine method is used. The material is mordanted with 1-3% bichromate and 1-1½%

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of tartar or similar substance for 1-1½ hours at the boil. It is then washed and dyed in a fresh bath with about five per cent. of acetic acid. The material is entered at 100°, brought to boil in one-half hour and boiled until the bath is exhausted. For piece dyeing the addition of Glauber's salt to the dyebath is beneficial. The shades obtained on chrome mordant are brighter than those developed with bichromate, but the fastness to fulling is not as satisfactory, but this can be improved by back-chroming, although it makes the shade greener. As far as possible, wooden kettles should be used in dyeing.

The fastness of these colors produced with Fast Mordant Blue B is very satisfactory. They are very fast to light, being equal to alizarines. The fastness to fulling of the bichromate developed dyeing answers all requirements, and with proper handling will not stain cotton, wool or silk. The mordant dyed shades without back-chroming are not so satisfactory. Dry finishing practically does not change the chrome developed shades; the others are made somewhat greener. In potting the same difference is shown. All Fast Mordant Blue B shades are fast to rubbing, stoving, acid and carbonizing. Interwoven vegetable fibres are left perfectly white by either method of dyeing, and silk is only slightly stained when the color is dyed with acetic acid and developed with bichromate.

Fast Mordant Blue B is recommended for the production of very fast blue shades on all classes of woolen material.

FAST ACID GREEN BB EXTRA Pat.

This is a bright, bluish shade of green. It is dyed in the usual way with Glauber's salt and sulphuric acid. It can be combined with violet and red dyestuff to make various shades of navy blue; and can also be used in combination with other similar dyestuffs for making shades of brown, and other desirable combined shades.

This dyestuff is very easily soluble and dyes level on all kinds of material. It can be fed at a boil, if necessary.

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The fastness to rubbing is good. Fastness to light is about the same as Patent Blue. In carbonizing with sulphuric acid, the shade is changed; but after neutralizing the original shade returns, so that it can be used when this process is necessary.

The fastness to stoving is fair. With very strong sulphuring the shade is made somewhat bluer.

As regards washing, hot drying, and pressing, the Fast Acid Green BB extra is similar to Patent Blue. It is not affected by chrome, and therefore, can be used in combination with chrome developed colors either as an addition to the original bath or for shading.

It is especially recommended as a level dyeing color in dyeing wool, either as pieces or yarn; and for the production of cheap navy blues and other combined shades in combination with Chromotrope 6B and 2R, Amido Naphthol Red 6B and 2R, Victoria Violet 4BS, with Yellow and Orange when necessary.

The interwoven cotton is not stained, and silk is dyed as deep as wool.

ALIZARINE YELLOW 5G POWDER.

This, like the other marks of Alizarine Yellow, requires the use of chromium mordants in dyeing and printing. The shade is materially greener than that of Alizarine Yellow GGW powder. The fastness is similar; the shades being fast to washing, soaping, and also to light. It is especially recommended for printing, as it can be discharged by both oxidizing and reducing discharges.

It can be combined with basic dyestuffs without the addition of tannin; the shades obtained by this method being fast to washing and light. It is especially recommended for greens in combination with Methylene Blue.

The dyestuff is easily soluble in hot water. In the preparation of print colors the dyestuff is dissolved with boiling water and stirred for a short time until it dissolves, it is then mixed with the thickening, and, after cooling, the chrome mordant is added. These formulas give good results.

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YELLOW PRINT COLOR.

- 20 parts Alizarine Yellow 5G Powder
- 400 parts Hot Water
- Heat until dissolved and mix with
- 400 parts Wheat Starch Tragacanth Thickening
- 50 parts Formic Acid 80%
- 30 parts Glycerine
- Cool and add
- 100 parts Chromium Acetate (green) 20° Bé.
- Make up to 1000 parts.

GREEN PRINT COLOR.

- 20 parts Alizarine 5G Powder
- 340 parts Hot Water
- Heat, and when dissolved mix with
- 400 parts Wheat Starch Tragacanth Thickening
- 50 parts Formic Acid 80° Bé.
- 30 parts Glycerine
- 2½ parts Methylene Blue DBB
- Dissolve in
- 30 parts Water
- Cool, and add
- 100 parts Chromium Acetate (green) 20° Bé.
- Mix up to 1000 parts.

These are printed on unprepared goods, steamed about 1½ hours without pressure, washed and soaped for 10 minutes at 140° F.

WOOL PRINTING BLACK NB.

This is a new wool dyestuff which is particularly recommended for printing chlored woollen piece-goods. On this material the color is very fast and does not bleed in washing and cloud the patterns. The fastness to light is also good.

The dyestuff is easily soluble in hot water and is fixed by means of acid reagents, such as alum, tartaric acid, oxalic acid, or

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ammonium oxalate. For thickening either a mixture of gum tragacanth and British gum, or a mixture of wheat starch and British gum should be used. Before printing the material should be chlored and the color fixed afterward by steaming with moist steam. If this is done the whites are not made yellow nor stained by the bleeding of unfixed dyestuff.

Usually the shade of Wool Printing Black NB. is satisfactory but it may be shaded with Victoria Yellow, Patent Blue, Acid Violet, etc., and any desired shade obtained.

In practice the printing pastes are made up as follows:

- 20 parts Wheat Starch
- 180 parts Cold Water
- 150 parts British Gum
- 50 parts Acetic Acid 8° Bé.
- Mix well and add the color solution of
- 60 parts Wool Printing Black NB.
- 500 parts Boiling Water
- Boil well together, cool and add
- 40 parts Ammonium Oxalate
- 5 parts Sodium Chlorate
- Make up to 1000 parts.

After printing, steam while damp for 1½ to 2 hours without pressure, and then wash thoroughly to remove the thickening and unfixed dyestuff and dry.

CARMINOGEN BB.

This new dyestuff is recommended for making lakes which are especially useful for the manufacturers of colored and wall papers. The shade is a brilliant bluish red which in tone is equal to the geranium lake made from eosine, but the fastness to light is particularly good, being much greater than any similar shade from other dyestuffs.

In making lakes from this color it is essential to observe the proper order in the addition of the reagents. As the pure barium

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lake is the most permanent, this should be perfectly formed before the addition of other metallic oxides as bases, for example, aluminum hydrate.

The following formulas give the most brilliant lakes, care being taken to mix the solutions in the order given:

METHOD NO. 1.

- A. { 40 parts Barytes mixed with
100 parts Water
- B. { 4 parts Carminogen BB dissolved in
200 parts Water
- C. { Precipitate with
20 parts Barium Chloride in
200 parts Water
- D. { 10 parts Calcined Glauber's Salt dissolved in
100 parts Water

METHOD NO. 2.

- A. { 40 parts Barytes in
100 parts Water
- B. { 22 parts Barium Chloride dissolved in
220 parts Water
- C. { 8 parts Carminogen BB in
400 parts Water
- D. { 10 parts Calcined Glauber's Salt dissolved in
100 parts Water

PIGMENT SCARLET G.

This is a dyestuff for making lakes, with properties similar to those of Carminogen BB and Pigment Scarlet 3B. These lakes are very pure in shade and distinguished for their fastness to light, which is equal or superior to that of Alizarine lakes.

In precipitating this color care must be taken that the lake is properly formed. If the precipitation is not complete, the result-

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ing lakes will be yellow in tone and greatly diminished in fastness. For this reason the color solution must not come in contact with acid reagents or bases as these prevent the proper lake formation.

This product can be mixed with Pigment Scarlet 3B for the production of intermediate shades.

It is recommended for the manufacture of colors for wall paper, oil colors, printing inks, etc. The following formula will give a perfectly satisfactory lake:

- A. { 9 parts Pigment Scarlet G
450 parts Water
- B. { 2½ parts Calcined Soda
22½ parts Water
- C. { 18 parts Barium Chloride
180 parts Water

Mix the solutions in the above order, bring to the boil, boil 2 minutes, cool, and then add the following base:

- A. { 10 parts Sulphate of Alumina
100 parts Water
- B. { 5 parts Calcined Soda
50 parts Water

Mix these solutions cold and wash three times by decantation.



PART V
Educational



Educational

LOWELL TEXTILE SCHOOL.

The Lowell Textile School situated at Lowell, Mass., on the bank of the Merrimack River, has a location which is ideal for a school of the character. It is but a few miles from Boston, the hub of the educational influence of the country, and with the local atmosphere of textile manufacturing a student has exceptional advantages to pursue his chosen line of work. The school offers five regular day courses, namely: Cotton Manufacturing, Wool Manufacturing, Designing, Chemistry and Dyeing, and Textile Engineering. The latter course commenced with the opening of the present school year, and aims to include a thorough instruction in Mechanical Engineering with special reference to the construction and operation of machines and mills. It also embraces a study of the generation and transmission of power for textile manufacturing. It is intended to meet a demand of young men who wish to prepare themselves for positions as Mill Engineers, Master Mechanics and all positions connected with the power department of a textile industry.

The department of Chemistry and Dyeing has been greatly strengthened by additional equipment, including expensive laboratory apparatus and a large amount of machinery for the commercial dyeing department. This includes a raw stock dyer, skein dyer, a chain warp dyer, jig dyer, piece dyer, drying cans, raw stock dryer, etc.; also, a number of dye tubs for piece dyeing. Before the beginning of the next school year the color shop and industrial chemistry laboratory will be located in a separate room especially equipped for this line of work.

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The Finishing Department has received extensive additional machinery. This comprises a wet jig, steamer, crab, rolling machine, tenter and dryer, rotary napper, kicker mill, sanding machine, perch, measuring and burling tables, besides soap tanks and hydro extractor. With the machinery previously installed the equipment is sufficiently complete to finish all of the principal woolen and worsted cloths found on the market.

A back washer of special design has been placed in the Woolen and Worsted Department. The students in this department have this year been given greater opportunity for instruction and practice in wool sorting. The scouring plant has been in extensive operation and a variety of wool has been scoured. A complete plant of French spinning is expected to arrive within a month and should be in operation for instruction to the present senior class.

As now equipped the school is able to give practical instruction in all processes from the fibre to the finished cloth.

THE BRADFORD DUFFEE TEXTILE SCHOOL, Fall River Mass.

This school was opened to students on March 7, 1904.

This building, which was built expressly for the purpose, is thoroughly equipped with the latest and most improved cotton machinery of all kinds and has every provision for class rooms, lecture rooms and laboratories for conducting a successful school.

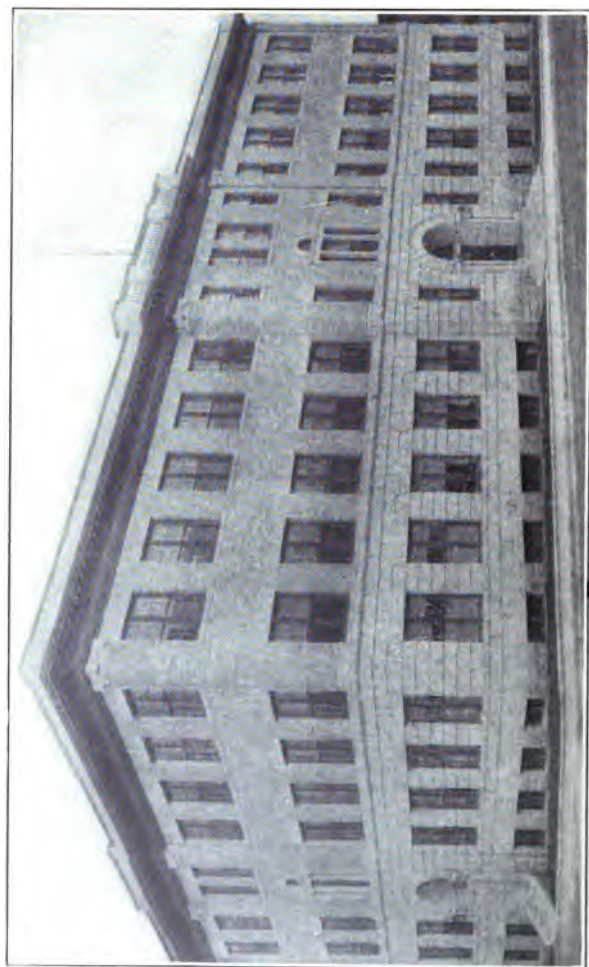
Its location in this great textile centre proves of the greatest advantage to the institution. Fall River now operates about three and one quarter millions spindles, making almost every variety of cotton goods from print cloths to the finest dress goods. In the manufacture of the finer goods large quantities of silk are also used.

There are located here forty-one corporations owning eighty-seven mills, representing an investment of over fifty millions of dollars.

There are also other industries closely allied to the mills, includ-



Lowell Textile School .



Bradford-Durfee Textile School

Educational

ing bleacheries, dyehouses, and two of the largest printing works in the country.

The courses of instruction pursued in this school embody the most advanced and progressive features incident to a systematic and thorough study of the cotton textile industry. The organization of the various departments has been most complete and is designed to meet the needs of two distinct classes of students; one class being those who wish a preliminary training in the art of manufacturing before entering upon the practical work of the mill; the other class being those already at work in the mill, who feel the necessity for a training in the principles of the art and a greater knowledge of all departments of their chosen vocation.

The school has enjoyed a most successful season in the year which is now drawing to a close, several departments having been taxed to the limit of their capacity to care for the students coming for instruction.

The department of Chemistry and Dyeing will, during the coming summer, be moved into more spacious laboratories which are being fitted to accommodate the increasing number of students which come for instruction in the various courses of this department.

These courses cover a wide range of subjects and are designed to train students for various positions as textile chemists and textile colorists.

A special feature in this department is the practical dyehouse where are installed machinery and apparatus for bleaching, dyeing, steaming and drying of yarns in various forms and in large quantities. The student here has opportunity to increase his knowledge, obtained in the class room and in the experimental laboratory, by the handling of materials on a larger scale. The products are used in the other departments of the school and greatly stimulate the interest manifested by the students.

The textile student will find here every convenience and aid for successfully prosecuting to the greatest advantage his chosen study and work.

Year-Book for Colorists and Dyers

NEW BEDFORD TEXTILE SCHOOL.

The chief item of interest in connection with the New Bedford Textile School is the building of the new addition, work on which was commenced in November, 1905. Owing to the open winter the work has progressed rapidly, and the building will no doubt be completed by the first of June.

The building will give to the school an additional floor space of approximately 17,000 sq. ft., thus allowing the school to add to its equipment very materially. A portion of the new equipment will consist of such dyeing machinery as will enable the school to do dyeing on a commercial scale.

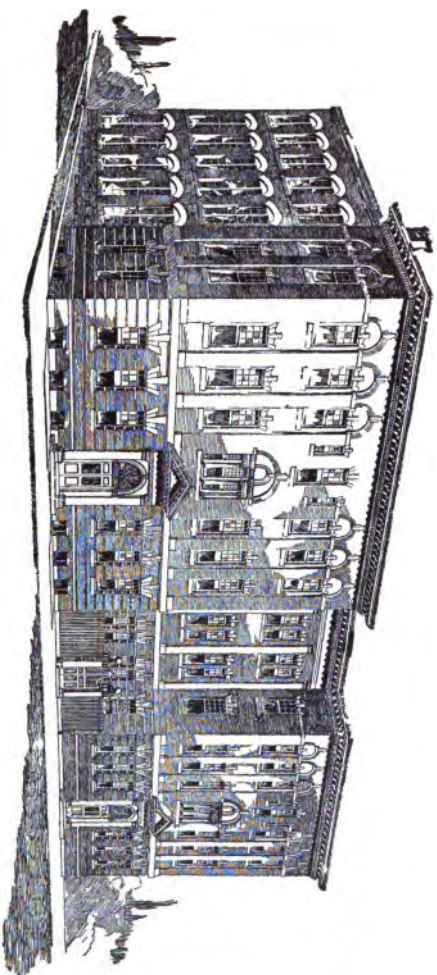
CLEMSON AGRICULTURAL COLLEGE.

Textile Department.

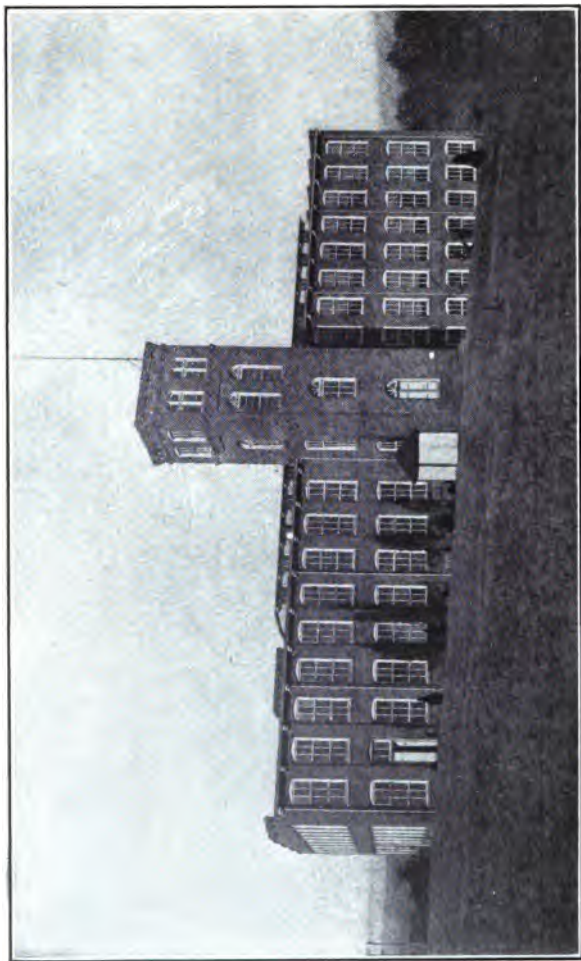
C. S. DOGGETT, DIRECTOR, TEXTILE CHEMISTRY AND DYEING.

The Textile Department of the Clemson Agricultural College of South Carolina was the first textile school to be established in the Southern States, and the third in the United States, having been started in 1897. The regular course is of four, the special of two years duration. In addition, the post-graduate work is laid out to meet the individual needs of mature students. In the full course the student acquires a good general education as well as a special training in textiles. In the last two years of the course, half the time is given to the study of the principles underlying the various processes of textile manufacturing, and half to practical work. The special course is designed for young men who have had some mill experience, and who would avail themselves of evening courses had they the opportunity. A beginning has been made in establishing scholarships for the benefit of these special students, both by a mill for one of its employees, and by individuals, open to the employees of any mill.

The courses are being broadened gradually, keeping pace with the rapid development of the cotton industry of the State, and meeting every demand for better equipped graduates. All the



New Bedford Textile School



Textile Building, Clemson College

Educational

instructors have had mill experience in their special line, and so are able to fit the students to meet mill requirements.

Constant additions to the equipment enable the students to become familiar with the latest improvements in textile machinery; while, on the other hand, friends of the college have placed in the museum specimens of the crude reel and hand loom of by-gone days. A collection of samples of textiles from all parts of the world is being made for the use of the students and to render service to the mills of the estate by having readily accessible to them a "consulting textile museum" for their designers.

Through the liberality of the Southern Railway and the Atlantic Coast Line, a fine passenger coach of the first named railroad was used for the extension work of the college the past season, and transported free over the greater part of the state. All departments of the college were represented. The textile department was thus enabled to render material aid to the schools of the state, and to emphasize to its citizens the magnitude and possibilities of the textile industry within her borders.

MISSISSIPPI TEXTILE SCHOOL.

Department of Chemistry and Dyeing.

During the past year the department of Chemistry and Dyeing has occupied the new dyehouse recently erected for it. This was built as an addition to the main building by the school, and is adjacent to the chemical laboratory and the instructor's office. The dyehouse has a floor space of 2,000 square feet, which will accommodate the apparatus and appliances necessary for the work in experimental and practical dyeing. The facilities now afforded will make it possible for the students to dye, bleach or otherwise prepare all materials required by them in the execution of the various patterns designed and woven in the school; a certain number of which are finished by each student who takes the regular course. For a detailed statement of the courses offered by the Chemistry and Dyeing Department, see the Year Book for 1904.

Year-Book for Colorists and Dyers

During the past year there have been some changes in the force of instruction of the school. W. E. Winchester, Director of the School, 1903-1905, resigned to go into business. The place has been filled by the appointment of Wm. R. Meadows. H. D. Lord, Instructor in Carding and Spinning, 1904-1905, resigned to go into business. The place made vacant by A. E. Benson, in the Department of Power Weaving, has been filled by the appointment of Robert Gregory.

Additional equipment has been arranged for in all departments of the school, and the curriculum will be broadened in keeping therewith.

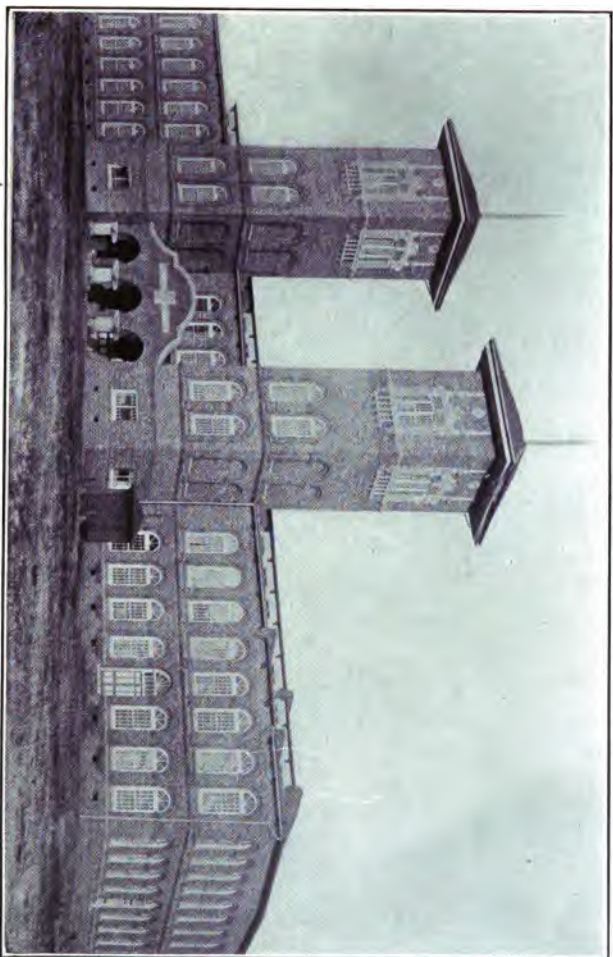
THE PHILADELPHIA TEXTILE SCHOOL.

The Chemical and Dyeing Department of the Philadelphia Textile School has exhibited considerable growth during the past year. The complete course now embraces three years of study and includes advanced work in the theory and practise of the manufacture of dyestuffs. We believe this is the only school in America where work of this character is given. The branch of textile printing has also been considerably enlarged and developed.

The Chemical and Dyeing Department is now so organized that on satisfactorily completing the second year's work, the student receives a certificate; while on completion of the third year's work, he receives a full diploma in Chemistry and Dyeing.

During the present school year (1905-1906) there are seventeen full day students in the Department of Chemistry and Dyeing, and forty-three evening students. Besides these sixty students, who devote their time exclusively to studies in this department, there are seventy-six other day students in the various departments of the Textile School, together with nineteen day students of the Art School who also receive considerable instruction in the various branches of chemistry and dyeing.

One of the principal features of the instruction in dyeing as carried out in the Philadelphia School is the large amount of practical dye-house work required by the student.



Mississippi Textile School

Educational

The school possesses a well-equipped practical dye-house and each student has to work out various problems in dyeing on a comparatively large scale. Upwards of five hundred different lots of wool, cotton, silk, mercerized cotton, etc., in the form of yarn, loose stock, and cloth, and varying from one-half pound to forty pounds in each lot, are dyed in all manner of different shades for different purposes. To match selected colors, the student is given excellent practice. We believe a larger amount of practical work is carried out in the dye-house of the Philadelphia Textile School than in any similar institution either in this country or in Europe.



BOOKS OF THE YEAR.



AMERICAN AND ENGLISH.

THE CHEMISTRY AND PRACTICE OF FINISHING; A PRACTICAL TREATISE ON THE BLEACHING AND FINISHING OF COTTON GOODS.

By P. Bean, F.C.S., M.Ph.S. and Wm. McCleary.
Kirkham & Pratt, Manchester, 1905.

LEATHER DRESSINGS—PARTS I AND II.

By M. C. Lamb, F.C.S.
The Leather Trades Pub. Co., London, 1905.

THE SPINNING AND TWISTING OF LONG VEGETABLE FIBRES—(FLAX, HEMP, JUTE, TOW AND RAMIE).

By Herbert R. Carter.
Charles Griffin and Company, Ltd., London.
J. B. Lipincott Company, Philadelphia, 1905.

Year-Book for Colorists and Dyers

THE SYNTHETIC DYESTUFFS AND THE INTERMEDIATE PRODUCTS FROM WHICH THEY ARE DERIVED.

By John Cannel Cain, D.Sc., and Jocelyn Field Thorpe, Ph.D.
Charles Griffin and Company, Ltd., London.
J. B. Lippincott Company, Philadelphia, 1905.

Foreign.

DIE APPARATEFAERBEREI.

Von Dr. Gustav Ullmann.
Julius Springer, Berlin, 1905.

LA SOIE ARTIFICIELLE, CELLULOSE ET FABRICATION DE LA SOIE ARTIFICIELLE.

Par M. P. Willems.

PRAKTISCHES HANDBUCH DES ZEUGDRUCKS.

Dr. Eduard Lauber.
Supplement-Band zur vierten Auflage des I Bandes und zweiten
Auflage des II und III Bandes, Leipzig, 1905.

DIE MIKROSKOPIE DER TECHNISCH VERWENDETEN FASERSTOFFE—EIN LEHR UND HANDBUCH DER MIKROSKOPISCHEN UNTERSUCHUNG DER FASER- STOFFE, GEWEBE UND PAPIERE.

Bearbeitet von Dr. Franz Ritter v. Hoehnel, K.K., Professor an der
Technischen Hochschule in Wien.

II Auflage.

A. Hartleben's Verlag, Wien und Leipzig, 1905.

Educational

FORTSCHRITTE DER TEERFARBENFABRIKATION UND
VERWANDTER INDUSTRIEZWEIGE. AN DER HAND
DER SYSTEMATISCH GEORDNETEN UND MIT KRI-
TISCHEN ANMERKUNGEN VERSEHENEN DEUTSCHEN
REICHS-PATENTE.

Dargestellt von Dr. P. Friedlander.

Vorstand der chemischen Abteilung des k.k. technologischen
Gewerbemuseums in Wien.

Siebenter Teil., 1902-1904.

Julius Springer's Verlag, Berlin, 1905.

HYPOCHLORITE UND ELECTRISCHE BLEICHE.

Von Victor Engelhardt.

• Wilhelm Knapp, Halle, Germany.

CHIMICA DELLE SOSTANTE COLORANTI.

By Dr. Arturo Pellizza.

Ulrico Hoepli, Milan, Italy.





PART VI

List of Dyestuffs
Makers and Methods





List of Dyestuffs, Makers and Methods

ABBREVIATIONS USED TO INDICATE THE DYESTUFF MANUFACTURERS AND THEIR AGENTS.

(A) Berlin Aniline Works, 213-215 Water St., New York; 122 Walnut St., Philadelphia; 124 Pearl St., Boston; 208 Kinzie St., Chicago; 9 E. Pearl St., Cincinnati; 27 S. Tryon St., Charlotte, N. C. American agents for the Actiengesellschaft für Anilinfabrikation in Berlin.

(A A C) American Color & Chemical Co., Albany, N. Y. Agent (At). Consolidated with H. R. W.

(A C) Anchor Color Mfg. Co., 462 Cherry St., New York.

(A M) Actiengesellschaft für Chemische Industrie, Mannheim, Germany.

(Ash) T. C. Ashley & Co., 145 Milk St., Boston.

(At) F. E. Atteaux & Co., 176 Purchase St., Boston; 176 Fulton St., New York; 17 Kinzie St., Chicago; West Fulton St., Gloversville, N. Y.; 53 Colborne St., Toronto, Ontario; 15 Le-moine St., Montreal, P. Q.

(B) Badische Anilin und Sodafabrik, Ludwigshafen am Rhein, Germany. Agent (P K).

(B A Co.) British Alizarine Co., Ltd., Silvertown, Victoria Docks, London, England. Agent (Bch).

(Bai) Bairstow & Co., 211 Pearl St., New York.

(B C F) Basler Chemische Fabrik, Basel, Switzerland.

(Bch) Beach & Co., Hartford, Conn. Agents for (B A Co.).

(Br S), (E F W), (Grie) and (Rh).

(Bd) J. A. & W. Bird & Co., 43 Cedar St., New York. Agents for (ClCo) and (LD).

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(B E) C. vom Bauer, Elberfeld, Germany.

(B K) Leipziger Anilinfabrik Beyer und Kegel, Leipzig, Germany. (Closed).

(B L) Bosson & Lane, 36 Central Wharf, Boston, Mass.

(Br S) Brooke, Simpson & Spiller, Ltd., Hackney Wick, London, England. Agents (Beh).

(Bs) C. Bischoff & Co., 88 Park Place, New York; 151 S. Front St., Philadelphia; 124-126 Purchase St., Boston; 10 Weybosset St., Providence; 196 Michigan St., Chicago; 416 St. Paul St., Montreal. Agents for (D) and (L).

(Bt) F. Bredt & Co., 194 Fulton St., New York; 12 S. Front St., Philadelphia. Agents for (K B).

(By) Farbenfabriken, vormals Fried, Bayer und Co., Elberfeld, Germany. American agents, Continental Color and Chemical Co.: 128 Duane St., New York; 32 India St., Boston; 11 No. Water St., Philadelphia; 80 So. Water St., Providence; 228 Randolph St., Chicago; Trust Building, Charlotte, N. C.; Coristine Building, Montreal, Canada. Agents for (B and By).

(C) Leopold Cassella & Co., G.m.b.H., Frankfort-am-Main, Germany. Manufacture Lyonnaise de Matieres Colorantes, Lyons, France, and Russische Anilinfarbenfabrik, Riga. Agent (Math).

(C D C) Central Dyestuff and Chemical Co., Plum Point Lane, Newark, New Jersey.

(C J) Carl Jäger Anilinfarbenfabrik, Barmen, Germany.

(Cl Co) The Clayton Aniline Co., Ltd., Clayton, Manchester, England. Agent (Bd).

(C R) Claus & Rée, Droylsden, Manchester, England.

(C V) Colne Vale Chemical Co., Milnsbridge, Huddersfield, England.

(Cz) John Casthelaz, Bruère & Co., Belbeuf, Rouen, France.

(D) Farbenfabrik Dahl & Co., Barmen, Elberfeld, Germany. Agents (Bs).

(D H) Farberwerke vormals Durand, Huguenin & Co., Basel and Hünigen, Jersey City, N. J.

Dyestuffs, Makers, and Methods

(D W) L. Destree, A. Wiescher & Co., Haeren near Brussels, Belgium.

(E F W) Elton Fold Works, Bury, Lancashire, England. Agent (Bch).

(E H) E. de Haen, List, near Hanover, Germany.

(F) Farbwerk Friedrichsfeld, Mannheim, Germany.

(F G B) F. G. Brown, 112 N. Delaware Ave., Philadelphia.

(Fi) Alfred Fischesser & Co., Muhlhausen, Elsass, Germany. (Closed).

(F T M) Fabriques de Produits Chimiques de Thann et de Mulhouse, Alsace, Germany.

(G) Anilinfarben und Extract Fabriken, vormals Joh. Rud. Geigy & Co., Basel, Switzerland; Greuzbach, Moscow and Maromme. Agent (Kell).

(Gau) Gauhe & Co., Eitdorf, Germany.

(Gb) Anilinfarbenwerk, vormals A. Gerber & Co., Basle, Switzerland. Absorbed by (I).

(Gei) Geisenheimer & Co., 189 Front St., New York; 19 Pearl St., Boston; 31 S. Front St., Philadelphia. Agents for (O).

(Gr) Rob. Graesser Chemical Works, Ruabon, North Wales.

(Grie) Farbwerke Griesheim, Germany. Agent (Bch).

(Gt) Gilbert Aniline Co., Philadelphia.

(H) Read Holliday & Sons, Ltd., Huddersfield, England; 7 Platt St., New York; 125 Pearl St., Boston; 107 North Second St., Philadelphia.

(H M) Heller-Merz Co., Newark, N. J.; 22 Cliff St., New York.

(H R W) Hudson River Anilin Color Works, Albany, N. Y. Agent (By).

(H S) The Hanna-Schoelkopf Co., Schoelkopf, Hartford & Hanna Co., successors.

(I) Gesellschaft für Chemische Industrie, Basle, Switzerland. Agent (Klp).

(In) Innis & Co., 120 William St., New York; 36 Strawberry St., Philadelphia; 161 Kinzie St., Chicago.

(Jb) J. B. Ibels, Brussels, Belgium.

Year-Book for Colorists and Dyers

(J H) J. Hauff, Stuttgart, Germany.

(Jy) O. S. Janney & Co., 17 N. Water St., Philadelphia; 70 Kilby St., Boston.

(K) Kalle & Co., Biebrich-am-Rhein, Germany; 530 Canal St., New York; 145 Pearl St., Boston; 37 Letitia St., Philadelphia.

(Kar) Ph. H. Karcher & Co., 14 Cedar St., New York.

(K B) K  chler & Buff, Crefeld, Germany. Agent (Bt).

(Kell) Geigy Aniline and Extract Company, successors to John J. Keller & Co., 69 Barclay St., New York; 135 Pearl St., Boston; 46 North Front St., Philadelphia; 18 Prior St., Atlanta, Ga.; 56 S. Water St., Providence. Agents for (G).

(Ki) Kinzelberger & Co., Prague, Austria.

(Klp) A. Klipstein & Co., 122 Pearl St., New York; 50-52 N. Front St., Philadelphia; 283-85 Congress St., Boston; 136 Kinzie St., Chicago; 13 Mathewson St., Providence. Agents for (I) and (N).

(L) Farbwerk M  hlheim, vormals A. Leonhardt & Co., M  hlheim-am-Main, Germany. Agent (Bs).

(L D) Lepetit, Dollfus e Gansser, Susa, Milan, Italy. Agent (Bd).

(Lev) Levinstein, Limited, Manchester, England.

(L F) L. B. Fortner, 36-38 Strawberry St., Philadelphia.

(L L) John W. Leitch & Co., Milnsbridge, England.

(L M) Leeds Mfg. Co., Brooklyn, N. Y.

(Lo) Charles Lowe & Co., Stockport, England.

(L P) Lucien Picard & Co., St. Fons, Lyons, France. Operated by (A).

(L Sch) Lembach & Schleicher, Biebrich-am-Rhein, Germany.

(Ly) Thomas Leyland & Co., 53 India St., Boston, Mass.; 121 N. Front St., Philadelphia, Pa.

(M) Chemische Fabriken, vorm. Weiler-ter Meer. Uerdinden, Germany.

(M) Farbwerke, vormals Meister, Lucius & Br  ning, H  chst-am-Main, Germany, Creil and Moscow. Agent (Mz).

Dyestuffs, Makers, and Methods

(Math) Cassella Color Co., successors to W. J. Matheson & Co., Ltd., 182-184 Front St., New York; 126-128 S. Front St., Philadelphia; 524 Atlantic Ave., Boston; 64 Exchange Place, Providence; 47 N. Pryor St., Atlanta, Ga.; Youville Square, Montreal.

(Mo) Société Chimique des Usines du Rhone, formerly Gillard P. Monnet & Cartier, St. Fons, Lyons, France.

(Mz) H. A. Metz & Co., successors to Victor Koechl & Co., 122 Hudson St., New York; 140-142 Oliver St., Boston; 104 Chestnut St., Philadelphia; 23 South Main St., Providence; 4 N. Clark St., Chicago; 210 S. Tryon St., Charlotte, N. C.; Empire Bldg., Atlanta, Ga.; Dock and Brown Sts., Newark, N. J.; 580-582 Howard St., San Francisco, Cal.; 55 St. Francois Xavier St., Montreal, Can.; 28-30 Wellington St. West, Toronto, Can.; Hamburg, Germany. Agents for (M), (W C B).

(N) Carl Neuhaus, Elberfeld, Germany. Agent (Klp).

(Nat) National Dye Co., Philadelphia.

(N I) Farbwerk W. Noetzel, Istel & Co., Griesheim-am-Main, Germany.

(N Y B) New York & Boston Dyewood Co., 156 William St., New York; 115 High St., Boston; 122 Arch St., Philadelphia; 16 Hughson St., Hamilton, Ontario.

American Dyewood Company, successors, 156 William St., New York; 648 Bourse, Philadelphia.

(O) K. Oehler, Anilin u. Anilinfarbenfabrik, Offenbach-am-Main, Germany. Agent (Gei).

(P) Société Anonyme des Matières Colorantes et Produits Chimiques de St. Denis, France. A. Poirrier and G. Dalsace, Paris. Agent (S S).

(P C) Theodore Peters, Chemnitz, Germany.

(P K) Kuttroff, Pickhardt & Co., successors to Wm. Pickhardt & Kuttroff, successors Continental Color and Chemical Co., 128 Duane St., New York; 32 India St., Boston; 80 S. Water St., Providence; 11 No. Water St., Philadelphia; 228 Randolph St.,

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Chicago; Trust Building, Charlotte, N. C.; Coristine Building, Montreal, Canada. Agents for (B) (By).

(P L) Pick, Lange & Co., Amersfoort, Holland. Closed. Chemische Fabrik Amersfoort successors.

(P S) Ferd, Petersen & Co., Schweizerhalle, Basle, Switzerland.

(R) Joh. Conr. Reihlen, Friedensau, Neuhausen, Germany.

(Rice) C. F. Rice, 174 Summer St., Boston.

(R D) Roberts, Dale & Co., Manchester and Warrington, England.

(R E) Remy, Erhart & Co., Weissenthurm-am-Rhein, Germany. Agent, Fr. Schroeder, 100 William St., New York.

(R F) Ruch et Fils, Pantin, France.

(Rh) Société Chimique des Usines de Rhone, France. Agent (Bch). See (Mo).

(S) Chemische Fabrik, vormals Sandoz & Co., Basle, Switzerland.

(S B) A. Sevoz & Boasson, Lyons-Vaise, France.

(Sch) Schoellkopf, Hartford & Hanna Co., successors to the Schoellkopf Aniline & Chemical Co., Buffalo, N. Y.; 100 William St., New York. Selling agents, National Aniline and Chemical Co., New York, 100 William St.; Philadelphia, 109 N. Water St.; Boston, 36 Purchase St.; Providence, 28 N. Main St.; New Haven, Conn., 211 Water St.; Cincinnati, 232 E. Pearl St.; Chicago, 110 Michigan St.; Milwaukee, 175 Clinton St.; Kansas City, 413 W. 5th St.; Minneapolis, 114 Second St., North.

(SS) Walter F. Sykes & Co., 85 Water St., New York; 132 Chestnut St., Philadelphia. Agents for (P).

(St) The Stamford Mfg. Co., 133-137 Front St., New York.

(Th) E. M. Thayer & Co., 106-112 Broad St., Boston, Mass.

(U I) United Indigo & Chemical Co., 176 Federal St., Boston.

(V) Verein Chemischer Fabriken in Mannheim, Germany. Agent, Roessler & Hasslacher Chemical Co., 100 William St., New York.

(Va) H. S. Vila, 115 S. Second St., Philadelphia, Pa.

(W) Williams Bros., Hounslow, Middlesex, England.

Dyestuffs, Makers, and Methods

(W C B) W. C. Barnes & Co., Ltd., Hackney Wick, London, England. Agent (Mz).

(Z) Friedrich Zimmer, Mannheim, Germany.

DYEING METHODS.

For economy of space, in order that the information may be more readily found, the dyeing methods are given by certain suggestive letters in accordance with the following:

WA indicates wool is dyed in acetic acid.

WN means that wool is dyed in a neutral bath.

WG indicates that wool is dyed in a bath containing Glauber's salt.

WGS means that wool is dyed with Glauber's salt and sulphuric acid in the bath.

WGSch indicates that wool is first dyed with Glauber's salt and sulphuric acid in the bath and the color then developed with chrome.

WACH means that wool is first dyed with acetic acid and chrome added to develop the color.

WCh indicates that chromed wool is used with the dye.

SA means that silk is dyed in a bath acidified with acetic acid.

SS means that silk is dyed in a bath acidified with sulphuric acid.

CT indicates that the dyestuff is used on cotton mordanted with tannin.

CD means that cotton is dyed direct in one bath.

CDv indicates that the color is developed on cotton by subsequent treatment after direct dyeing.

CAL indicates cotton dyed with alum and Glauber's salt.

CWD—cotton and wool mixed goods dyed in one bath.

SULPHUR denotes one of the new class of sulphur dyes requiring special treatment.

These extremely brief directions are used for the further reason that the dye manufacturers themselves prefer that specific information be obtained from their offices. In many places no dyeing suggestions are given on this account.

Year-Book for Colorists and Dyers

LIST OF DYESTUFFS, MAKERS AND METHODS.

Name of Dye.	Agent or Maker.	Dye Method.
Acetine Blue	PK	Printing
Acetinduline R	Mz	Printing
Acetopurpurine 8B	A	CD
Acetylene Blue 6B, 3B, Bx, 3R	Klp	CD
Acetylene Pure Blue	Klp	CD
Acid Alizarine Black 3B, 3Bex	Mz	WGSCb
Acid Alizarine Black R, AC	Mz	WGSCb
Acid Alizarine Black SE, SET paste ..	Mz	WACH
Acid Alizarine Black SE, SET powder ..	Mz	WACH
Acid Alizarine Black SN, SNT	Mz	WGSCb
Acid Alizarine Black T	Mz	WGSCb
Acid Alizarine Blue BB	Mz	WGSCb
Acid Alizarine Blue GR	Mz	WGSCb
Acid Alizarine Blue Black B	Mz	WGSCb
Acid Alizarine Brown B, BB, T	Mz	WGSCb
Acid Alizarine Dark Blue SN	Mz	WGSCb
Acid Alizarine Garnet R	Mz	WGSCb
Acid Alizarine Gray G	Mz	WGSCb
Acid Alizarine Green B	Mz	WGSCb
Acid Alizarine Green G	Mz	WGSCb
Acid Alizarine Grenade R	Mz	WGSCb
Acid Alizarine Red B, G	Mz	WGSCb
Acid Alizarine Violet N	Mz	WGSCb
Acid Alizarine Yellow O, RC	Mz	WGSCb
Acid Anthracene Brown T, G, R	By	WGSCb
Acid Anthracene Red, G, BB	By	WGSCb
Acid Black	Mz	WGS
Acid Black B	AAC	WGS
Acid Black BE new	Klp	WGS
Acid Black B No. 4	AC	WGS
Acid Black 5B, 8B, FL	By	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Acid Black 10B	Sch	WGS
Acid Black C	Klp	WGS
Acid Black 77	AC	WGS
Acid Black 2531	Kell	SS
Acid Black 5534	H	WGS
Acid Black 5535	H	WGS
Acid Black J	NYB	WGS
Acid Black S, 3G	H	WGS
Acid Blue AA	Kell	WGS
Acid Blue BB	Sch	WGS
Acid Blue GG	Sch	WGS
Acid Blue FS, 466	Mz	WGS
Acid Blue 76	Sch	WGS
Acid Blue 100	Sch	WGS
Acid Blue R	NYB	WGS
Acid Blue Black 3B	By	WGS
Acid Brown	Bs	WGS
Acid Brown D	Math	WGS
Acid Brown G	A	WGS
Acid Brown R	A	WGS
Acid Brown Y	Sch	WGS
Acid Carmoisine B	Bk	WGS
Acid Carmoisine 6B	H	WGS
Acid Cerise	Mz, S S	WGS, SS
Acid Cerise O, ii	Mz	WGS, SS
Acid Chrome Black BG, WS, TC	By	WGSCh
Acid Chrome Brown T	By	WGSCh
Acid Crimson	Bs	WGS
Acid Cyanine BR	By	WGS
Acid Eosine G	Mz	WGS
Acid Fuchsine	Mz, Bs, Klp	WGS
Acid Fuchsine S B	PK	WGS
Acid Green	By, Klp, O	WGS, SS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Acid Green B	P	WGS
Acid Green 2B	P	WGS
Acid Green 3B, 6B	By, P	WGS
Acid Green 4B	P	WGS
Acid Green bluish	NI	WGS, SS
Acid Green conc.	Mz	WGS
Acid Green conc. D	Mz	WGS
Acid Green conc. G	Mz	WGS
Acid Green conc. M	Mz	WGS
Acid Green conc. ii	Mz	WGS
Acid Green D	Mz	WGS, SS
Acid Green EC	Mz	WGS, SS
Acid Green extra conc. B	Math	WGS, SS
Acid Green extra conc. paste	Math	
Acid Green GG	H	WGS
Acid Green 5G	Math	WGS
Acid Green J	P	WGS
Acid Green JEEE	P	WGS
Acid Green M	Mz	WGS, SS
Acid Green M., 5 fold conc.	Mz	WGS
Acid Green O	Mz	WGS
Acid Green OG	O	WGS, CT
Acid Green 780	Math	WGS
Acid Grenadine	Kell	WGS
Acid Grenadine B	Kell	WGS
Acid Indigo Blue	Mz, H	WGS
Acid Magenta	Mz ...PK, SS, WGS, SS	
Acid Magenta B	Mz	WGS, SS
Acid Magenta BC Crystals	Kell	WGS, SS
Acid Magenta Crystals	Mz	WGS, SS
Acid Magenta GC Crystals	Kell	WGS, SS
Acid Magenta O	Mz	WGS, SS
Acid Marine Blue A	Math	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Acid Maroon O	Mz	WGS, SS
Acid Methyl Violet 5B	PK	WGS
Acid Milling Scarlet	Br S	WGS
Acid Naphthol Orange		WGS
Acid Navy Blue	Bd	WGS
Acid Orange G	Kell	WGS, SS
Acid Phosphine JO	C	Leather
Acid Phosphine GO	Mz	Leather
Acid Phosphine BRO	Mz	Leather
Acid Ponceau	Klp	WGS
Acid Rhodamine R, 3R	Klp	WGS
Acid Rosamine A pat	Mz	WGS, SS
Acid Rubin (see Fuchsine Ex. S)		WGS, SS
Acid Rubin SB	PK	WGS
Acid Rubine BBR	Mz	WGS
Acid Ruby	Klp	WGS
Acid Sky Blue	At	WGS
Acid Violet 2B	Kell, PK	WGS
Acid Violet 3B extra BW	By	WGS
Acid Violet bluish	Kell	WGS
Acid Violet BN, 2BN	PK	WGS
Acid Violet 4B extra	By, A	WGS
Acid Violet 4BN	Klp, PK	WGS
Acid Violet 4BS	Math	WGS, SS
Acid Violet 4BX	By	WGS
Acid Violet 5B extra	Kell	WGS
Acid Violet 5BF	Mz	WGS
Acid Violet 5BFI	Mz	WGS
Acid Violet 5BS	At	WGS
Acid Violet 5BX	Math	WGS
Acid Violet 6B	A, By, Kell, G....	WGS
Acid Violet 6BC	Sch	WGS
Acid Violet 6BF	Mz	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Acid Violet 6BIN	Mz	WGS
Acid Violet 6BN	Klp, PK	WGS, SS
Acid Violet 6BS	Mz	WGS
Acid Violet 7B	Mz, Klp, PK, WGS, SS	
Acid Violet 7BN	Mz	WGS
Acid Violet Double	Kell	WGS
Acid Violet N	Mz	WGS
Acid Violet R	O	WGS
Acid Violet R conc.	Mz	WGS
Acid Violet R extra	By	WGS
Acid Violet R R	Kell	WGS
Acid Violet 2R extra	By	WGS
Acid Violet 3R extra	By	WGS
Acid Violet 3RA	Mz	WGS
Acid Violet 3RS	Mz	WGS
Acid Violet 4R	Klp, PK	WGS
Acid Violet 4RN	PK	WGS
Acid Violet 4RS	Mz	WGS
Acid Violet 6R	Sch.	WGS
Acid Violet S7B	PK	WGS
Acid Violet S4R	PK	WGS
Acid Violet VSW	O	WGS
Acid Violet ii	Mz	WGS
Acid Violet 118	HS	WGS
Acid Yellow	Mz, A, Klp, Math, O, SS, WGS	
Acid Yellow Crystals	Mz, Math	WGS
Acid Yellow AT	Math	WGS
Acid Yellow D	A	WGS
Acid Yellow G		
Acid Yellow RS	Bs	WGS
Acid Yellow S, see Naphthol Yellow ...	S.	
Acid Yellow 8822	H	WGS
Acme Brown	Math	CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Acme Yellow	Mz	WGS, SS
Acridine Gold Yellow, G	Bs	CT
Acridine Orange	Mz	SA, CT
Acridine Orange G	Bs	CT
Acridine Orange NO	Mz	CT
Acridine Orange R extra	Mz	CT
Acridine Red B, 2B, 3B	Mz	CT
Acridine Scarlet R, 2R, 3R	Mz	CT
Acridine Yellow	Mz, Bs	SA, CT
Alcohol Blue	S, Bs, By, Mz, PK, SS	
Alcohol Blue SFC	K.	
Alcohol Eosine	tM.	
Alizadine Brown R, W, Y	H	WGSCh
Alizadine Chocolate	H	WGSCh
Alizarine Astrol B	By	WGS, WCh
Alizarine Black Bayer FB, NG, GA ...	By	WGSCh
Alizarine Black 4B	Math	WA
Alizarine Black 4BN	Math	WA
Alizarine Black 4BR	Math	WA
Alizarine Black 4BS	Lev	WA
Alizarine Black 6B	Math	WA
Alizarine Black CB, CT	Mz	WGSCh
Alizarine Black D	Math	WA
Alizarine Black DAC	Mz	CDv
Alizarine Black DCB	Mz	CDv
Alizarine Black DCR	Mz	CDv
Alizarine Black DE	Mz	CDv
Alizarine Black DG	Mz	CDv
Alizarine Black DHW	Mz	CDv
Alizarine Black DN	Mz	CD
Alizarine Black DPG	Mz	CDv
Alizarine Black DPR	Mz	CDv
Alizarine Black DR	Mz	CDv

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Black DRN	Mz	CD
Alizarine Black DT	Mz	CDv
Alizarine Black DYG	Mz	CDv
Alizarine Black G	Me, By	WCh
Alizarine Black P	Mz	WCh
Alizarine Black R	Bs, Math	WCh
Alizarine Black RT	Mz	CDv
Alizarine Black S	Mz, Math, PK ...	WCh
Alizarine Black SRA	PK	WCh
Alizarine Black SW, WB	PK	WCh
Alizarine Black T	Math	WCh
Alizarine Black TBA	A	WGSCb
Alizarine Black, WB extra, SW	B	WCh
Alizarine Black WX extra	PK	WACH
Alizarine Blue A	Mz	WCh
Alizarine Blue A B	B A Co	WCh
Alizarine Blue Black 3B, B	By	WCh
Alizarine Blue Black WB extra	B	WACH
Alizarine Blue ASR	B	WCh
Alizarine Blue B R 3 G	By	WCh
Alizarine Blue C G, CRR, CWRR	By	WCh
Alizarine Blue CRW	SS	WCh
Alizarine Blue CS	Math	WCh
Alizarine Blue DB	Mz	CD
Alizarine Blue DBX	Mz	CD
Alizarine Blue DE	Mz	CD
Alizarine Blue DET	Mz	CD
Alizarine Blue DG	Mz	CD
Alizarine Blue D N	Mz	WCh
Alizarine Blue D N W	Mz	WCh
Alizarine Blue D N X	Mz	WCh
Alizarine Blue DR, D2R, D4R	Mz	CD
Alizarine Blue FA	Mz	WCh

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Blue G	Mz	WCh
Alizarine Blue G B, P L	AC	WCh
Alizarine Blue G N	Bs	WCh
Alizarine Blue G S	At	WCh
Alizarine Blue G T	Bs	WCh
Alizarine Blue GW, JR	By	WCh
Alizarine Blue J G	HS	WCh
Alizarine Blue NGG powder	PK	WCh
Alizarine Blue N S	By	WCh
Alizarine Blue O D R	At	WCh
Alizarine Blue paste	Mz	WCh
Alizarine Blue R	Mz	WCh
Alizarine Blue RR	Mz	WCh
Alizarine Blue S A P, SKY	By	WGS, WCh
Alizarine Blue S paste	PK	WCh
Alizarine Blue S powder	PK	WCh
Alizarine Blue SB powder, paste	Mz	Printing
Alizarine Blue SBW powder	Mz	WCh
Alizarine Blue SCA	Ac	WCh
Alizarine Blue SR powder, paste	Mz	Printing
Alizarine Blue S2R powder, paste	Mz	Printing
Alizarine Blue soluble powder ABS ...	B A Co	WCh
Alizarine Blue Black B, 3B	By	WCh
Alizarine Bordeaux B in paste	By	WCh
Alizarine Bordeaux B D in paste	By	WCh
Alizarine Bordeaux P	Mz	WCh
Alizarine Bordeaux C	Me	WCh
Alizarine Bordeaux G, GG	By	WCh
Alizarine Brown	Mz, By, PK	WCh
Alizarine Brown AS	Klp	WCh
Alizarine Brown DB	Mz.	CD
Alizarine Brown DBD	Mz.	CD
Alizarine Brown DD	Mz	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Brown, DG, D2G, D3GO, D3GI	Mz	CD
Alizarine Brown DM	Mz	CD
Alizarine Brown DR	Mz	CD
Alizarine Brown DX	Mz	CD
Alizarine Brown G	Mz	WCh
Alizarine Brown GN, AW, AT	By	WCh
Alizarine Brown O DR	At	WCh
Alizarine Brown paste	Mz	WCh
Alizarine Brown powder	Mz, By	WCh
Alizarine Brown O, F, N	Mz	WCh
Alizarine Brown R	Mz, Me, Rice	WCh
Alizarine Brown R B	By	WCh
Alizarine Brown S O	PK	WCh
Alizarine Brown Y	By	WCh
Alizarine Cardinal	By	
Alizarine Carmine	B A Co	WCh
Alizarine Carmine Blue B, G	By	WCh
Alizarine C A	B A Co	WCh
Alizarine Claret DB, DG	Mz	CD
Alizarine Claret R paste	Mz	WCh
Alizarine Coelestol R	By	WGS, WCh
Alizarine Cyanine G paste	By	WCh
Alizarine Cyanine Green 3G	By	WGSCh
Aliz. Cyanine R, 2R, 3R, RA extra	By	WCh
Alizarine Dark Blue	PK	WCh
Alizarine Dark Blue, D, DR	Mz	CD
Alizarine Dark Blue D3R	Mz	CD
Alizarine Dark Blue S	Mz	WCh
Alizarine D G, GI	PK	WCh
Alizarine Fast Black SP	By	WCh
Alizarine Gray SP	By	Printing
Alizarine Green paste	Pk	WCh

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Green B	Bs	WCh
Alizarine Green B	A	WA
Alizarine Green C, SS	By, Rica	WCh
Alizarine Green CE paste, CG, CK	By	WGS, WCh
Alizarine Green DW	PK	WCh
Alizarine Green EB, G	Bs	WCh
Alizarine Green F	A	WACH
Alizarine Green F powder	Sch	WCh
Alizarine Green KO	By	Sulphur
Alizarine Green S paste	Mz	WCh
Alizarine Green SE	Mz, PK	WCh
Alizarine Green S pat	Math	WCh
Alizarine Grenat R	Mz	WCh
Alizarine Indigo DO	Mz	CD
Alizarine Indigo S paste	PK	WCh
Alizarine Irisol R	By	WGS, WCh
Alizarine Lanacyl Blue BB, 3B	Math	WCh
Alizarine Lanacyl Navy Blue B pat ...	Math	WA
Alizarine Lanacyl Blue R	Math	WA
Alizarine Lanacyl Violet B pat	Math	WA
Alizarine Maroon paste	PK	WCh
Alizarine Olive OD	At	WCh
Alizarine Orange A paste	PK	WCh
Alizarine Orange AO, AOP	B A Co	WCh
Alizarine Orange DF, DG, DR	Mz	CD
Alizarine Orange G	Mz, By	WCh
Alizarine Orange N, O	Mz	WCh
Alizarine Orange powder	Mz	WCh
Alizarine Orange P	Mz	WCh
Alizarine P	B A Co	WCh
Alizarine Red D4B	Mz	CD
Alizarine Red E D	Bs	WCh
Alizarine Red F paste 4F, 5F	Mz	WCh

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Red GG	PK	WCh
Alizarine Red PS	By	WCh
Alizarine Red RG	Mz	WCh
Alizarine Red RX	Mz	WCh
Alizarine Red S	Mz, PK	WCh
Alizarine Red SDG	Mz	WCh
Alizarine Red WB	By, PK	WCh
Alizarine Red WS	Mz	WCh
Alizarine Red X	Mz	WCh
Alizarine Red D1B new, D4NB	Mz	WCh
Alizarine Red No. 1 powder	Mz	WCh
Alizarine Red 2A	Mz	WCh
Alizarine Red 2ABL, BL	Mz	WCh
Alizarine Red 2 BW	Mz	WCh
Alizarine Red 1 W	Mz	WCh
Alizarine Red 1 WS	Mz	WCh
Alizarine Red 2 A W	Mz	WCh
Alizarine Red 2W	Mz	WCh
Alizarine Red 2 WS	Mz	WCh
Alizarine Red 3 GW	Mz	WCh
Alizarine Red 3W	Mz	WCh
Alizarine Red 3 WS	Mz	WCh
Alizarine Red 4 FW	Mz	WCh
Alizarine Red 4 WS	Mz	WCh
Alizarine Red 5 WS	Mz	WCh
Alizarine Saphirol SE	By	WGS
Alizarine Saphirol B	By	WGS
Alizarine Scarlet DG, D2R	Mz	CD
Alizarine Sky Blue B	By	WGS
Alizarine Violet extra	At	WCh
Alizarine Violet G paste	Mz	WCh
Alizarine Violet N	St	WCh
Alizarine Violet B	Bs	WCh

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Alizarine Violet paste	Mz	WCh
Alizarine Viridine paste FF	By	WCh
Alizarine Yellow A paste	PK	WCh
Alizarine Yellow C	Bs	WCh
Alizarine Yellow DG, DR, D3G, DOO ..	Mz	CD
Alizarine Yellow DR	Bs	WCh
Alizarine Yellow FS	Klp	WCh
Alizarine Yellow GG, GGW, N	Mz	WCh
Alizarine Yellow GG	A	WCh
Alizarine Yellow GG	Lev	WGS
Alizarine Yellow LW	PK	WCh
Alizarine Yellow O, paste, R, RW powder	Mz	WCh
Alkali Blue	A, Brs, Bs, By, Sch, Kell, Klp, Math, O, PK, SS.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 7B, BBR, R, R conc. extra	Mz.	
Alkali Blue B, 2B, 3B, 4B, 5B, 6B, 6B90 per cent., 6B, 100 per cent., R, 2R, 3R	Math.	
Alkali Blue 2B, 3B, 4B, 5B, 6B, H6B, H5BOO, H3BOO	O.	
Alkali Blue D	A.	
Alkali Blue 4B	Jb.	
Alkali Blue XG	Br. S.	
Alkali Brown	Bs	CD
Alkali Brown R	LP	CD
Alkali Fast Green B, G, 3B	By	WGS
Alkali Fast Red B, G	Mz	WGS
Alkali Green	Br. S.	
Alkali Red	Bs.	
Alkali Red B, R	Mz.	

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Alkali Violet, CA	PK.	
Alkali Violet R	By.	
Alkali Yellow, R	Ba.	
Alpine Blue		WGS
Alsace Brown B, BB, MR, LL, R	At	CD
Alsace Gray	Fi.	
Alsace Green, J	FTM.	
Amaranth	Mz, Math	SS
Amaranth B	Math	WGS, SS
Amaranth E, O	Mz	WGS, SS
Amaranth extra	SS.	
Amido Acid Black B, 4B, 6B, BL, BLG. A		WGS
Amidoazol Cutch	H	CD
Amidoazol Drab	H	CD
Amidoazol Gray	H	CD
Amidoazol Green B	H	CD
Amido Fast Black	Mz	Printing
Amido Fast Brown	Mz	Printing
Amido Naphthol Black 4Bex, 6B, S, R. Mz		WGS
Amido Naphthol Red 2B, 6B, G	Mz	WGS
Aminogene Blue R		
Aminogene Violet R		
Anil Blue R	K.	
Aniline Brown	Fi.	
Aniline Green	Math	WGS, CT
Aniline Orange	Math	CT
Aniline Yellow	Bt	WGS, SS, CT
Aniline Yellow extra	Klp.	
Aniline Yellow NT	Math	CD
Anisoline	Math	CD
Anisol Red	Mo	WGS, SS, CD
Anthra Alizarine Bordeaux	At	WACH
Anthra Alizarine Carmoisine	At	WACH

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Anthra Alizarine Green CG	At	WACH
Anthra Alizarine Red B	At	WACH
Anthra Alizarine Yellow G	At	WACH
Anthracene Acid Black C	Klp	WCh
Anthracene Acid Black LW, SF, ST, SW	Math	WGSCh
Anthracene Acid Brown B, G, N, R, SW pat, V	Math....	WGS, WCh, SA
Anthracene Black		
Anthracene Blue C	Math	WCh
Anthracene Blue S, SWX, WB, WG, WR, SWGG extra	PK	WCh
Anthracene Brown paste	Ba, Co, By	WCh
Anthracene Brown G paste, R paste ...	By	WCh
Anthracene Brown O paste	Mz	WCh
Anthracene Brown RR	Bs	CDv
Anthracene Chrome Black, F, 5B, FE ..	Math	WGSCh
Anthracene Chrome Blue BB, F, G	Math	WGSCh
Anthracene Chrome Brown, D	Math	WCh
Anthracene Chrome Green	Math	WCh
Anthracene Chrome Red, A	Math	WCh
Anthracene Chrome Violet, B R	Math	WCh
Anthracene Croceine B, G	F	WCh
Anthracene Dark Blue	PK	WCh
Anthracene Green, or Coeruleine		WCh
Anthracene Red	By, I, Klp	WGS
Anthracene Red B	HS	WGS
Anthracene Scarlet OR	HS	WGS
Anthracene Yellow paste	By	WCh
Anthracene Yellow BN, C, GG, R	Math	WGS, WCh
Anthracene Yellow GN	Bs	WCh
Anthracite Black BR	Math	WGS
Anthracyanine BL, DL, FL, 3FL	By	WGS, WCh

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Anthracyl Chrome Brown D	D	WACH
Anthracyl Chrome Gray	D	WACH
Anthracyl Chrome Green	D	WACH
Anthracyl Chrome Olive	D	WACH
Anthragallol, or Anthracene Brown ...	Math	WCh
Anthramine yellow	At	WCh
Anthraquinone Blue SR	PK	WGSCh
Anthraquinone Green G, Gex.....	B	WGS, WGSCh
Anthraquinone Violet	PK	WGS
Apollo Red	Kell	WGS
Arabian Black	Bai	CD
Archil Red 3 VN	P	WGS
Archil Substitute N powder	Math	WGS
Archil Substitute G powder	Mz	WGS
Archil Extract, 1, 2, 3, 4	Math	WGS
Archil Extract extra and conc.	Mz	WGS
Arnica Yellow	Kell	CD
Atlanta Yellow 103	HS	CD
Atlas Orange	BrS	WGS, SS
Atlas Red	BrS	WGS, SS
Atlas Scarlet	By	WGS
Auracine G	By	CT
Auramine G	G, Klp, PK	WG, CT
Auramine O, 1 II, conc.	G, Klp, Mz, PK, WG, CT	
Aurantia	A	SS
Aureoline	Klp	CD
Aureosine		
Aurine	Gr, Lo, LP, Mo, RD.	
Auronal Black	Tm	Sulphur
Aurophenine	Mz	CD
Aurophosphine G	A	SA
Aurotine	ClCo.	
Autogene Black	SS	Sulphur

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Autogene Brown BG	SS	Sulphur
Autogene Gray	SS	Sulphur
Azaleine		
Azarin R, S	Mz	Lakes
Azin Blue, alcohol soluble	Bs.	
Azindon Blue G, R	Mz	CT
Azin Green GO, BO, TO	Mz	WGS, CT
Azin Scarlet G conc. GO	Mz	WG, SA, CT
Azo Acid Black B, BL, G, GL, 3BL, R, TL, extra conc., TL, No. 2 extra	Mz	WGS
Azo Acid Blue B, 3 B conc., 3 BO	Mz	WGS
Azo Acid Brown	By	WGS
Azo Acid Carmine B	Mz	WGS
Azo Acid Fuchsin B, G	Mz	WGS
Azo Acid Magenta B, G, B conc., G conc. Mz	Mz	WGS
Azo Acid Red B, BA	Mz	WGS
Azo Acid Ruby, 2B	Bs	WGS
Azo Acid Violet AL	By	WGS
Azo Acid Violet 4R R extra	By	WGS
Azo Acid Yellow	A, NYB	WGS
Azo Alizarine Black	DH	WCh
Azo Alizarine Bordeaux	DH	WCh
Azo Alizarine Yellow CG	DH	Printing
Azo Archil R	A	WGS
Azo Benzol Fast Crimson	B	WGS
Azo Black O	Mz	WGS, SS
Azo Black Blue	O	CD
Azo Blue	Mz, By, A	CD
Azo Bordeaux	Sch, By, O	WGS
Azo Brown N	Bs, Math	WGS
Azo Brown O	Mz	WGS
Azo Brown V	Mz	WGS
Azo Brown Y	P	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Azo Carmine G paste, B	PK	WGS
Azo Carmine G	A	WGS
Azo Cardinal G	A	WGS
Azo Chrome Blue T, TB	C	WGSCh
Azo Chromine	Kell	WGS
Azo Coccine 7B, or Cloth Red	A	WGS
Azo Coccine G, or Tropaeoline 0000 ...		WGS
Azo Coccine 2R	A	WGS
Azo Cochineal	By	WGS
Azo Coralline	Bs	WGS
Azo Corinth	O.	
Azo Crimson L, S	By	WGS
Azo Dark Blue	O	CD
Azo Diphenyl Blue		
Azo Eosine	By	WGS
Azo Flavine	Bs, PK	WGS, SS
Azophone Black	At	CD
Azophone Green B, G	At	CD
Azo Fuchsine B, G, GN, S	By	WGS
Azo Galleine	Kell	WCh
Azo Green	By	WCh
Azo Grenadine S	By	WGS
Azo Mauve B, R	O	CD
Azo Merino Black B, 6B	C	WGS
Azo Merino Blue 3B, G	Math	WGS
Azo Merino Dark Blue R	Math	WGS
Azo Navy Blue B, 3B	Math	WGS
Azomine Black	UI	CD
Azomine Yellow	UI	CD
Azo Orange R	Klp	CD
Azo Orseille BB	Math	WGS
Azo Orseille R	A.	
Azo Orseilline	A, By, O, PK.	

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Azo Patent Black 3BK, 4BK, 3BKN,		
TK	K	WGS
Azophenine Blue R	Grie	CT
Azophloxine 2G	By	WGS
Azophor Black S, DP	Mz	Printing
Azophor Blue D	Mz	Printing
Azophor Orange MN	Mz	Printing
Azophor Orange	Mz	Printing
Azophor Pink A, Base	Mz	Printing
Azophor Red PN	Mz	Printing
Azo Pink BB	Mz	Printing
Azo Red B, BB, G	Bs	WGS
Azo Rubine	O, Sch	WGS
Azo Rubine	O	WGS
Azo Rubine A	Math	WGS
Azo Rubine SG	A	WGS
Azo Ruby	tM, Lev	WGS
Azo Ruby S, 2S	A	WGS
Azo Saffranine	Kell	WGS
Azo Turkey Red	O.	
Azo Violet	Mz, A, By, Lev	CD
Azo Wool Blue B, SE	Math	WGS
Azo Wool Violet 4B, 7R	Math	WGS
Azo Yellow	Bt, K, Mz, Klp, O, SS	WGS, SS
Azo Yellow conc.	Mz	WGS
Azo Yellow M	Klp	WGS, SS
Azo Yellow N, NR	Kell	SS
Azo Yellow OR	Mz	WGS, SS
Basel Blue, BB, R paste, S	Klp	WG, CT
Bavarian Blue alcohol soluble	A.	
Bavarian Blue DBF, DSF	A	SA, CT
Belgium Blue	AC.	

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Bengal Blue	K.	
Bengal Deep Black D, 2B	SS	CDv
Bengal Pink	Klp	WGS
Benzaline Blue B	K	CT
Benzal Green, O powder, OO crystals...	O	WN, CT
Benzendamine	NI.	
Benzo Azurine G, 3G	Mz, A, By	CD
Benzo Azurine R, 3R	Mz, By	CD
Benzo Black	Mz, By	CD
Benzo Black Blue G, 5G, R	Mz, By	CD
Benzo Black Brown	By	CD
Benzo Blue BB, 3B, BX	By	CD
Benzo Bordeaux 6B	By	CD
Benzo Brown G, 5R, RC, NB, GG, MC	By	CD
Benzo Chrome Black B	By	CD
Benzo Chrome Black Blue, B	By	CD
Benzo Chrome Brown B, BS, 5G, R, 3R	By	CD
Benzo Copper Blue B, 2B	By	CD
Benzo Cyanine B, 3B, R	By	CD
Benzo Dark Brown	By	
Benzo Dark Green B, BB, GG	By	CD
Benzo Fast Black 3B, G	By	CD
Benzo Fast Blue B, Bn G, 5R	By	CD
Benzo Fast Gray	By	CD
Benzo Fast Orange S	By	CD
Benzo Fast Pink 2BL	By	CD
Benzo Fast Red L, GL, FC	By	CD
Benzo Fast Scarlet 4BS, 8BS, 5BS	By	CD
Benzo Fast Violet R, N	By	CD
Benzo Fast Yellow 5GL	By	CD
Benzo Flavine O. No. 2	O	CT
Benzo Gray	By	CD
Benzo Green G, C	By	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Benzo Indigo Blue	By	CD
Benzoin Yellow	B	WCh
Benzo Nitrol Brown G, N, 2R	By	CD
Benzo Nitrol Bordeaux G	By	CDv
Benzo Olive extra	By	CD
Benzo Orange R	A, By	CD
Benzopurpurine B, 4B, 6B, 10B	Mz, By, A	CD
Benzopurpurine 4Bex conc.	Mz	CD
Benzopurpurine 4B double	Mz	CD
Benzo Red SG, 10B, 12B	By	CD
Benzo Rhodamine 3B	By	CD
Benzo Rhoduline Red B, 3B	By	CD
Benzo Sky Blue	Mz, By, A	CD
Benzo Violet RL extra	By	CD
Benzyl Black B, 4B	Klp	WGS
Benzyl Blue S	Klp	WGS
Benzyl Bordeaux, B	Klp	WGS
Benzyl Blue S	Klp	WGS
Benzyl Green G, B	Klp	WGS
Benzyl Violet 4B, 10B, 5B, 5BN	Klp	WGS
Benzyl Violet	Bt, CR, RE, tM, WGS, SS, CT	
Berlin Blue A	A	WGS
Best Magenta Crystals	Bt.	
Best Violet, or Brilliant India Dye	Bt.	
Biebrich Acid Black ST	K	WGS
Biebrich Acid Blue, G, GG	K	WGS
Biebrich Acid Red B, 4B, 3G	K	WGS
Biebrich Acid Violet 2B, 6B	K	WGS
Biebrich Alizarine Black 4BN	K	WGS
Biebrich Patent Black AN, 4AN, AO 4BN, RO, 4B, B	K	WGS
Biebrich Patent Jet Black, 3BO	K	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Biebrich Scarlet	K	WGS
Bismarck Brown	A, CR, F, K, Math, NI, Lh, O, PK, SW ...	CT
Bismarck Brown B	Klp	CT
Bismarck Brown EE	Math	CT
Bismarck Brown FFG	Math	CT
Bismarck Brown G	Klp	CT
Bismarck Brown GG	Math, O	CT
Bismarck Brown GOO, G000	O	CT
Bismarck Brown R, Y Rex	Mz	CT
Bismarck Brown ROO, R000	O	CT
Bismarck Brown T	Klp	CT
Bismarck Brown YS 8049	Math	CT
Bitter Almond Oil Green	Bt	WGS, SS, CT
Black Black O	Mz	WGS, SS
Black Blue O	Mz	WGS, SS
Black Soluble in Oil	Mz, Math.	
Blackley Blue	Lev	SS, CT
Blue Asozin	P	WGS
Blue Alcohol Soluble	Mz.	
Blue B, BB	Mz	Printing
Blue BJB	P	WGS
Blue Black B	PK	WGS
Blue Black GR, 5G	Klp	WGS
Blue Black, Diphenyl	Kell	CD
Blue BS	Math, P	WGS
Blue 3BS	P	WGS
Blue BW	O.	
Blue CB, alcohol and water soluble ...	Klp.	
Blue extra	RD	CT
Blue for Silk	Math.	
Blue for printing, paste and powder ...	Mz.	
Blue for white	Kell	SS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Blue G	Jy	CT
Blue, green shade	Mz	WGS, SS, CT
Blue Green S	PK.	
Blue R	Mz	Printing
Blue, red shade	Mz	WGS, SS, CT
Blue T conc.	Mz	WGS, SS
Blue 2111	At	CD
Blue Black 5534	H	WGS
Body Blue O	Mz	WGS, SS, CT
Bordeaux B	Mz, A, Math, LP ...	RF
Bordeaux BL	Math	WGS, SS
Bordeaux BX	By	WGS
Bordeaux COV	A	CD
Bordeaux DH	Klp	WGS
Bordeaux Diamine B, S	Math	CD
Bordeaux extra	By	WGS
Bordeaux G	Ba, By	WGS
Bordeaux R extra	Mz	WGS
Bordeaux S	A, RF	WGS
Bottle Green	Bch.	
Brahma Orange	Z.	
Brahma Red B, BB, 6B	Z.	
Braxeline	At.	
Bright Blue extra	Mz	CD
Bright Blue O	BL	CD
Bright Yellow T	Mz, PK	CD
Brilliant Acid Carmine 6B	O	WGS
Brilliant Acid Green 6B	By	WGS
Brilliant Alizarine RR, 5R	By	CD
Brilliant Alizarine Blue D, G, R	By	WCh
Brilliant Alizarine Blue EM	Mz	WCh
Brilliant Alizarine Bordeaux R	By	WCh
Brilliant Alizarine Cyanine G, 3G	Ry	WCh

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Alizarine Viridine F.....	By	WCh
Brilliant Anthrazol	B	WGS
Brilliant Azurine B	A, By	CD
Brilliant Azurine 5G	Mz, A, By	CD
Brilliant Benzo Green B	By	CD
Brilliant Black B	PK	WGS
Brilliant Black Solution BE, NE, RE ..	Math.	
Brilliant Blue	Bs.	
Brilliant Blue 7B	O.	
Brilliant Blue HB	Gt	WGS
Brilliant Bordeaux S	A	WGS
Brilliant Carmine	NYB	SS
Brilliant Carmine Green	Lev	WGS
Brilliant Carmoisine O	A	WGS
Brilliant Cochineal 2R, 4R	Math	WG
Brilliant Chrome Red, paste	By.	
Brilliant Cloth Blue Bex, G	K	WAS
Brilliant Congo G, R	Mz, A, By	CD
Brilliant Cotton Blue B57	Sch	CAI
Brilliant Cotton Blue, greenish	By	CT
Brilliant Cresyl Blue 2B	L	CT
Brilliant Crimson B, O, N	Mz	WGS, CT
Brilliant Crocein blue, and yellow	Mz	WGS, SS, CAI
Brilliant Croceine AZ	Math	WGS
Brilliant Croceine B, BB	Mz	WGS, SS
Brilliant Croceine 3B	Mz, By, Math.	WGS, SS
Brilliant Croceine BOO	Math	WGS
Brilliant Croceine 5B	Mz, Math	WGS, SS
Brilliant Croceine 6B, 7B, 9B, 10B	Math	WGS
Brilliant Croceine D	Mz	WGS
Brilliant Croceine M, MOO	Math	WGS
Brilliant Croceine MOO	NYB	SS
Brilliant Croceine R	Mz, Math	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Croceine ROO	Math	WGS
Brilliant Croceine Scarlet D	Mz	WGS
Brilliant Cyanine Blue R	By	WCh
Brilliant Dianil Red R, R Conc.	Mz	CD
Brilliant Diazine Blue B, B	K.	
Brilliant Direct Navy Blue B	Bs	CD
Brilliant Direct Red 249	Sch	CD
Brilliant Fast Red P	By	Paper
Brilliant Geranine B, 3B	By	CD
Brilliant Green	Mz, By, CJ, CR, F, K, Klp, Math, PK, NI, O, PS, RE, tM, Bt, WN, SS, CT	
Brilliant Green crystals, B, C	Mz	WN, CT
Brilliant Green crystals extra, extra N, powder superior, ia, No. 12	Mz	WN, SA, CT
Brilliant Green O crystals	O	WN, CT
Brilliant Indigo Carmine sub	Lev	WGS
Brilliant Lake Scarlet G, R, 2 R.....	Mz	WGS, SS
Brilliant Milling Blue B	C	WGSch
Brilliant Milling Green B	C	WGS
Brilliant Milling Scarlet 2 B	Lev	WGS
Brilliant Opaline	Gb.	
Brilliant Orange G	Mz, A	WGS, SS
Brilliant Orange O, R.....	Mz	WGS, SS
Brilliant Orcelleine, pat	Math	WGS
Brilliant Orseille C	Math	WGS
Brilliant Ponceau G, GG	Math	WGS
Brilliant Ponceau 4R	By	WGS
Brilliant Ponceau 5R	Bs, By, Math	WGS
Brilliant Purpurine 10B	A	CD
Brilliant Purpurine R	Mz, A, By	CD
Brilliant Purpurine 4R	RF	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Brilliant Purpurine 5B	RF	CD
Brilliant Red	Sch	WGS
Brilliant Red D	Klp	WGS
Brilliant Red Congo G	Mz, A, By	CT
Brilliant Rhoduline Violet R	By	CT
Brilliant Rubine O	Mz	WGS, SS
Brilliant Safranine G	A	WGS, CT
Brilliant Scarlet	Lev.	
Brilliant Scarlet G, GG, R, RR, 3R, 4R, 6R, T	Math	WGS
Brilliant Scarletine	H	WGS
Brilliant Scarlet N3R	SS	WGS
Brilliant Sky Blue G	Bs	CD
Brilliant Sulphon Azurine R	By	
Brilliant Sulphon Red B	By	WGA
Brilliant Wool Blue B extra, G extra ..	By	SS, WGS
Brilliant Yellow	Mz, A, By, SB, SCH, tM	WGS, SS
Brilliant Yellow I	H	WGS
Brilliant Yellow S	PK	WGS, SS
Bromofluoresceic Acid Crystals	Mz	Lakes
Bromofluoresceic Acid AG, A3G, A6G ..	Mz	Lakes
Bromofluoresceic Acid AL	Mz	Lakes
Bromofluoresceic Acid BA, conc.	Mz	Lakes
Bromofluoresceic Acid BL Blue	Mz	Lakes
Bromofluoresceic Acid BL Yellow	Mz	Lakes
Bronze Blue J	PK	
Bronze Diamine G	Math	CD
Brown BBX	BrS	CD
Brown JE, JEEE	P	WGS
Brown M	P	WGS
Brown N	P	WGS
Brown SDM, SDP	SS	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Brown for Leather O	Mz	Tannin
Buffalo Black 4B, 8B	Sch	WGS
Buffalo Brown R	Sch	CT
Buffalo Bordeaux	Sch	CD
Buffalo Chrome Black	Sch	WGSch
Buffalo Crimson B	Sch	CD
Buffalo Rubine	Sch	CD
Buffalo Scarlet 4B	Sch	CD
Buffalo Thiol Black GB	Sch	Sulphur
Buffalo Violet 4R	Sch	CD
Butter Yellow	HM	
Cachou de Laval S	P	Sulphur
Cachou Diamine	Math	CD
Calico Yellow, GG, 3G, 4G	Kell	Printing
Campanuline	A	CD
Canarine	Klp.	
Capri Blue GN	Mz, Bs	CT
Capri Green B, G, GG	Mz	CT
Carbazol Yellow W	PK	CD
Carbid Black, BO, R, RO	Klp	CD
Carbon Black B, BD	Mz	WGS
Carbon Black BW	K	CD
Cardinal	Mz	WG, SA, CT
Carminogen BB	Mz	Lakes
Carmoisine	A, By, PK, SS ..	WGS
Carmoisine conc.	A, K, SS	WGS
Carnotine	ClCo	CD
Caroubier	Klp.	
Cashmere Black B, 6B, T	By	WGS
Cashmere Blue TG	By	WGS
Cashmere Brown V	By	WGS
Cerasine	Klp.	
Cerasine Blue LC	Math.	

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Cerasine Orange G	Math.	
Cerasine Red, A	Math.	
Cerasine Yellow, G T	Math.	
Cerise	Mz, Bt, Klp, Math, NI, PK, PS, SS, WG, SA, CT	
Cerotine Orange C, extra	O	WGS
Chestnut Brown	A	CD
Chicago Blue B, 4B, 6B, R, 2R, 4R, RW. A	A	CD
Chicago Gray	Kell	CD
Chicago Orange, G, extra, 3G	Kell	CD
China Blue	Mz, A, BrS, By, PN, WGS, SS, CT	
China Blue R, No. 1, 2	Math.	
China Blue 71115	KB.	
China Green crystals	Kell.	
Chinoline Blue	PK.	
Chinoline Green	A.	
Chinoline Red	A.	
Chinoline Yellow	Mz, BrS, By, PK, WGS	
Chloramine Blue 6B	S	CD
Chloramine Brown C, G	By	CD
Chloramine Orange G	By	CD
Chloramine Red 8BS	By	CD
Chloramine Violet	By	CD
Chloramine Yellow GG, C	By	CD
Chloranisidine	B	Lakes
Chlorantine Blue 2B	Klp	CD
Chlorantine Lilac	Klp, PK	CD
Chlorantine Red 8B	Klp	CD
Chlorantine Violet B, R	Klp	CD
Chlorazol Blue 6G, R, 2R, 6B	H	CD
Chlorazol Brilliant Blue 8B, 10B, 12B. H	H	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Chlorazol Brilliant Green B, G.....	H	CD
Chlorazol Brown A, B, C, R	H	CD
Chlorazol Green B, Y	H	CD
Chlorazol Heliotrope	H	CD
Chlorazol Yellow G, 3G, Y	H	CD
Chlorine Blue R	Klp	CT
Chlorine Blue T	Mz	Special
Chlorophenine G, O, R, Y	ClCo	CD
Chlorophenine Orange, AA, R	ClCo,	CD
Chromanil Black RF, BF, 2BF, 3BF ...	A	CD
Chromanil Brown GG, R, 2G	A	CD
Chromate Black 6B, TB4B	A	WGSch
Chromazine Violet	Sch	WCh
Chromazo Maroon	Sch	WCh
Chromazo Red RB	Sch	WCh
Chromazo Yellow GR	Sch	WCh
Chromazon Blue B, R	Kell	WGS
Chromazon Red	Kell	WGS
Chrome Azurine S	S	WCh
Chrome Black	Jy, SW	WGS
Chrome Black, B, T	Mz	WGSch
Chrome Blue	Jy, By, Math	WCh
Chrome Blue B	Mz	WCh
Chrome Blue 2B, 4B, BN, PE, R, 2R, 3R, No. 470	Kell	WCh
Chrome Bordeaux	By	WCh
Chrome Brown G	Kell	WCh
Chrome Brown BO, RO	Mz	WCh
Chrome Cyanine G, T	By	WACH
Chrome Fast Black B	A	WCh
Chrome Fast Black F	Klp	WGSch
Chrome Fast Blue B	Klp	WGSch
Chrome Fast Blue B, 4B	A	WGSch

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Chrome Fast Green G	Klp	WGSC
Chrome Fast Red B, GR	A	WGSC
Chrome Fast Yellow G, 2G, R	A	WCh
Chrome Green	By	WCh
Chrome Leather, Black B C	Math.	
Chrome Orange	By	WCh
Chrome Patent Black TB, TG, TR, T ..	K	WGSC
Chrome Patent Green A, N	K	WGSC
Chrome Prune	By	WCh
Chrome Red R	HS	WCh
Chrome Red paste	By	WCh
Chrome Ruby paste	By	WCh
Chrome Violet powder	By, Kell	WCh
Chrome Violet paste	By	WCh
Chrome Yellow	H S, N I	WCh
Chrome Yellow D	By	WCh
Chrome Yellow G	By, HS	WCh
Chrome Yellow P	Kell	WCh
Chrome Yellow R	SS	WACH
Chromindigene	Mz	Printing
Chromine G	K	WCh
Chromine Blue B, T	HS	WCh
Chromium Patent Black DG, DGG	K	WGSC
Chromocyanine	DH	Printing
Chromoglaucine V M paste	Mz	Printing
Chromogen I	Mz	WGSC
Chromotrop 2B, 6B, 8B, 10B, 2R	Mz	WGS
Chromotrop DW, FB, S, SB, SN, SR,		
F4B	Mz	WGSC
Chromotrop Blue A, WB, WG	Mz	WGSC
Chrysamine	By	CD
Chrysamine G	Mz, A, By	CD
Chrysamine GG	By	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Chrysamine R	Mz, A, By	CD
Chrysaniline		
Chrysoidine	Mz, A, By, K, PK, Lh, WN, SA, CT	
Chrysoidine AG, FF	Math	WN, SA, CT
Chrysoidine G	Kell, Klp, WN, SA, CT	
Chrysoidine R	Mz Kell, Klp, Math, WN, SA, CT	
Chrysoidine Y, YY	Mz, Sch, Math, WN, SA, CT	
Chrysoidine Brown	Math	WN, SA, CT
Chrysoine	Klp, Mz, PK, SS, tM	
Chrysoline	Kell	WGS
Chrysophenine R	Mz, A, By	CD
Chrysophenine conc., ext. conc.	Mz	CD
Chrysophenine G	Mz	CD
Cinereine	SS.	
Cinnabar Scarlet	BK.	
Cinnamine S	W.	
Cinnamon Brown	PS	WGS, CT
Citronine	Mz, BrS, Fi, Klp, O, SS	WGS, SS
Citronine A	Mz	WGS, SS
Citronine AA, 2A, extra, AHE NE	SS	SA
Citronine G, GOO, GOOO	O.	
Citronine NE	SS	SA
Citronine Diphenyl G	Kell	CD
Citronine Diphenyl GOO	O	SS
Claret Red	Sch	WGS
Claret Red B, 3B, G, GR, R, B extra O, S	Mz	WGS
Clayton Aurotine	ClCo.	
Clayton Carnotine	ClCo	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Clayton Cloth Red	ClCo	WGS
Clayton Fast Gray D	ClCo	Sulphur
Clayton Fast Black	ClCo	Sulphur
Clayton Red	ClCo.	
Clayton Yellow, G	ClCo	CD
Clematine	Kell	CT
Cloth Blue O	Mz	WGS, SS, CT
Cloth Blue S	L	WGS
Cloth Brown reddish, yellowish	Mz, By	WCh
Cloth Orange	Mz, By	WCh
Cloth Red	Mz	WCh
Cloth Red, see Stanley Red	ClCo.	
Cloth Red B	Mz, Bs, By, O	WCh
Cloth Red BA	A	WCh
Cloth Red 3B extra	By	WCh
Cloth Red BO, FRBO	O	WCh
Cloth Red G	Mz, By, O	WCh
Cloth Red G extra, 3G extra	By	WCh
Cloth Red GA, 3GA	A	WCh
Cloth Red GO, 3GO	O	WCh
Cloth Red O	Mz	WCh
Cloth Red OB	O	WCh
Cloth Red R	Bs	WCh
Cloth Scarlet G, R	K	WGS
Cloth Yellow G, R	O	WGSCh
Coccein 3B	SS	WGS
Coccine 2B	A	WGS
Coccinin, B	Mz	WGS
Cochineal Red A	PK	WGS
Cochineal Scarlet G	Sch	WGS
Cochineal Scarlet PS	By	WGS
Cochineal Scarlet 2R, 4R	Sch	WGS
Cochineal Substitute	Klp	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Coelestine Blue B	By	CT
Coeruleine A, B, S BWR	Mz	WCh
Coeruleine S powder or paste	Mz, By, Klp, PK ..	WCh
Coeruleine SW, powder or paste	Mz, By	WCh
Cold Black, BR	A	CD
Columbia Black B, BB, FB, R, FF	A	CD
Columbia Black FF extra, FB strong, F2B, 2BX, 2BW, EAextra, WA extra..	A	CD
Columbia Black Blue G	A	CD
Columbia Black Green D	A	CD
Columbia Blue G, R	A	CD
Columbia Brown R, M	A	CD
Columbia Chrome Black BB.....	A	CD
Columbia Fast Blue 2G	A	CD
Columbia Fast Red F	A	CD
Columbia Fast Scarlet 4B	A	CD
Columbia Green	A	CD
Columbia Orange R	A	CD
Columbia Red 8B, 6B, 4B, 2B	A	CD
Columbia Violet R	A	CD
Columbia Yellow	A	CD
Concentrated Cotton Blue R, 2R, 1, 2, 3, 4, B	Mz WGS, SS, CAI	
Congo	Mz, A, By	WN, CD
Congo B	SS.	
Congo BB	A, By	CD
Congo G R	A, By	CD
Congo Blue BX, R, 2B, 3B, 2BX	A	CD
Congo Brown G, R	A	CD
Congo Corinth B, G	A, By	CD
Congo Fast Blue B, R	A	CD
Congo GR	A, By	CD
Congo Orange G	A	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Congo Orange R	Mz, A, By	CD
Congo P, Pure Blue	A	CD
Congo 4 R	Mz, A, By	CD
Congo Red	Mz, Sch, Klp, By, A	CD
Congo Rubine	Mz, A	CD
Congo Violet	A	CD
Congress Red FEN	NI	CD
Coomassie Black B	Lev	CWD
Coomassie Blue	Lev	CWD
Coomassie Violet	NS	WGS
Coomassie Wool Black BA, conc., R, S.	Lev	WGS
Copper Black S	Mz	WGS, Dev
Copper Blue B, B extra	Mz	WGS, Dev
Copper Red		WGS, Dev
Coralline	LP.	
Coreine, AB, AR, RR	Klp	WCh
Corvan Black	B	WGSch
Cotton Black B, 3B	PK	CD
Cotton Blue	Mz, Bs	CAI
Cotton Blue BI	HS	WGS, CAI
Cotton Blue 3B, 6B extra	Mz, O	WGS, SS, CT
Cotton Blue O	Kell.	
Cotton Blue OO extra	O	CT
Cotton Blue R	PK, SS	CT
Cotton Bordeaux	PK	CD
Cotton Brown	PK	CD
Cotton Brown 3G, R	ClCo	CD
Cotton Brown N	Math	CD
Cotton Brown R, G	PK	CD
Cotton Dark Brown B	AC	CD
Cotton Green CG	A	CD
Cotton Navy Blue CR	AC	CD
Cotton Orange G, R	PK	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Cotton Ponceau	BK.	
Cotton Red, 4B	PK	CD
Cotton Rhodanine	BCF	CT
Cotton Scarlet	PK	CAI
Cotton Scarlet 3B	Sch, K	CAI
Cotton Scarlet O	Mz	WN, SA, CT
Cotton Scarlet, yellowish	Math	SA, CT
Cotton Yellow G, R	Kell	CD
Cotton Yellow G, GB, R	PK	CD
Cresotine Yellow G, R	Mz, A, By, O	CD
Cresyl Blue BB, 6B, BBSO, RR	Bs	CT
Cresyl Fast Violet B, BB	Bs	CT
Cresyl Green GG	Bs	CT
Cresyl Violet BB	Bs	CT
Criterion Blue G	At	WGS
Croceine AZ, X	Math.	
Croceine B, 3B	Sch	WGS, SS
Croceine 3BX	By, K	WGS
Croceine Orange	By, K	WGS
Croceine Scarlet 3B	Sch, By, K ..	WGS, CD
Croceine Scarlet 4BX	K	WGS
Croceine Scarlet 7B	By	WGS
Croceine Scarlet 8B	By, K	WGS
Croceine Scarlet 10B	By	WGS
Croceine Scarlet O extra	K	WGS
Cross Dye Black B, 4B, 6B	H	CD
Cross Dye Black RT	H	Sulphur
Cross Dye Drab	H	Sulphur
Cross Dye Yellow	H	Sulphur
Crow Black	Mz, PK	CD
Crumpsall Direct Fast Brown B, M O ..	Lev	CD
Crumpsall Fast Yellow YYFD	Lev	CD
Crumpsall Yellow	Lev	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Crystal Ponceau	A, PK	WGS
Crystal Ponceau 6R	Mz, Math	WGS
Crystal Scarlet 6R	Mz, Math	WGS, SS
Crystal Violet 5B	Math.	
Crystal Violet 5BO	Klp	WN, SS, CT
Crystal Violet O	Mz, PK	WN, SA
Crystal Violet P	By	WN, SA
Cuba Black R	O	CD
Cumidine Ponceau	Mz, A, PK	WGS
Cumidine Red	Mz, A, PK	WGS
Cupranil Brown B, R C	Klp	CD
Curcumeine extra	A	WGS
Curcumine	O	WGS, SS
Curcumine S, S extra	Mz, A, By	CD
Curcumine Substitute	SS	WGS
Curophenine	ClCo	CD
Cutch Brown D	Mz, N	WG, SA, CT
Cutch Brown D	ClCo	CD, WGS
Cutch Brown G	Mz	WG, SA, CT
Cutch Brown GG	BrS	CD
Cutch Brown O, R, VY	ClCo	CD, WGS
Cyanine B	Mz	WGS, SS
Cyanol extra, BB, FF, C	Math	WGS
Cyanol Fast Green G	Math	WGS
Cyanol Green B, CG, 6G	Math	WGS
Cyanosine	Klp.	
Cyanosine Alcohol Soluble	Mz.	
Cyananthrol BGA, R, RA, RB, RBA,		
RGA	B	WGS
Cyklamine	Mo	WG, SA
Cyprus Blue R	A	WGS Copper
Cyprus Green B	A	WGS Copper
Dahlia		WGS, SS, CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Dahlia for white	Kell	SS
Dark Blue	Mz, PK	WGS
Dark Brown	SW	CD
Dark Brown M, MB	Mz	WG, SA, CT
Dark Green	PK	WGS
Dark Green 682	BrS	CD
Deep Wool Black 2B, 3B	A	WG
Delphine Blue B, B conc.	Mz, S	WCh
Delta Purpurine 5B	Mz, By	CD
Delta Purpurine 7B	Mz, A, By	CD
Delta Purpurine G	By	CD
Diamine Azo Black B, BB pat ..	Math	CD
Diamine Azo Blue 54, 55	Math	CD
Diamine Azo Blue R, RR, pat ..	Math	CD
Diamine Black B, BH, BO, HW, RO, BX, RMW	Math	CD
Diamine Black Blue B	Math	CD
Diamine Black Green N	Math	CD
Diamine Blue B, 2B, 3B, BG, BX, C4B, 6G, C4R, LG, C2R, LR, NC, RW, 3R, SRX, 50, 52, 53, 55, AB, AZ	Math	CD
Diamine Blue Black E, 72592, R, RL ..	Math	CD
Diamine Bordeaux B, S	Math	CD
Diamine Brilliant Blue G	Math	CD
Diamine Brilliant Scarlet S	Math	CD
Diamine Bronze B, C, SF	Math	CD
Diamine Brown B, GG, 3G, M, OO, QQ, V, 31, 32, 33, 34, 35, 36, 37	Math	CD
Diamine Catechine B, G, pat. 3G	Math	CD
Diamine Catechu	Math	CD
Diamine Cutch	Math	CD
Diamine Cyanine B, 3B, R	Math	CD
Diamine Dark Blue B, R	Math	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Diamine Dark Green	Math	CD
Diamine Deep Blue RB	Math	CD
Diamine Deep Dark Blue B, R	Math	CD
Diamine Fast Black L	Math	CD
Diamine Fast Blue C, FFB, FFG, G....	Math	CD
Diamine Fast Brown G	Math	CD
Diamine Fast Red, F	Math	CD
Diamine Fast Yellow A, AR, B, FF, M, 3G	Math	CD
Diamine Gold	Math	CD
Diamine Gold Yellow	Math	CD
Diamine Gray G	Math	CD
Diamine Green B, G, CL	Math	CD
Diamine Heliotrope G	Math	CD
Diamine Milling Black B, FG extra ...	Math	CD
Diamine Jet Black CR, OO, 4D, RB, SE, S000, JEI	Math	CD
Diamine New Blue G, P, R	Math	CD
Diamine Nitrazol Black, B	Math	CD
Diamine Nitrazol Brown B, BD, T, G, RD	Math	CD
Diamine Orange D, DC, G, GC, R, B ..	Math	CD
Diamine Pure Blue, A, FF	Math	CD
Diamine Red B, 3B, 10B, D, No. 72732 .	Math	CD
Diamine Rose RD, B extra, BG, GD, GGN	Math	CD
Diamine Scarlet B	Math	CD
Diamine Scarlet 3B	HS, Math	CD
Diamine Sky Blue, FF	Math	CD
Diamine Steel Blue L	Math	CD
Diamine Violet N	Math	CD
Diamine Violet Red	Math	CD
Diamine WO	Math	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Diamine Yellow N, paste, R paste, CP	Math	CD
Diamineral Black B, 3B, 6B	Math	CD
Diamineral Blue R	Math	CD
Diamineral Brown G	Math	CD
Diaminogene B, BR, CF, extra	Math	CDv
Diaminogene Blue BB, G, RA, 2RA, NA, NB, 3RN	Math	CDv
Diaminogene Sky Blue	Math	CDv
Diamond Black F, NG, GA, FB, PV, PVB, P2B	By	WGSCh
Diamond Blue 4R	UI	WGS
Diamond Brown R, 3R	By	WGSCh
Diamond Fast Acid Black	Me.	
Diamond Fast Blue, Red Yellow	Me.	
Diamond Flavine G	By	WCh
Diamond Green SS	Mo, By	WGSCh
Diamond Green B, G	PK.	
Diamond Green crystals	KB.	
Diamond Orange paste	By.	
Diamond Yellow paste G, R	By	WCh
Dianil Black AC	Mz	CDv
Dianil Black CB, CR	Mz	CDv
Dianil Black E	Mz	CDv
Dianil Black G	Mz	CDv
Dianil Black HW	Mz	CD
Dianil Black N	Mz	CD
Dianil Black PG, PR	Mz	CDv
Dianil Black R	Mz	CDv
Dianil Black RN	Mz	CD
Dianil Black T	Mz	CDv
Dianil Blue B, BX, 2BM, 3BM	Mz	CD
Dianil Blue E, ET	Mz	CD
Dianil Blue G	Mz	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Dianil Blue R, 2R, 3R, 4R	Mz	CD
Dianil Blue 2RM, 3RM	Mz	CD
Dianil Brilliant Black B, G, 2G, R, 2R	Mz	CD
Dianil Brilliant Yellow S	Mz	CD
Dianil Brown B, BD	Mz	CD
Dianil Brown D	Mz	CD
Dianil Brown G, 2G, 3GO, 3GI	Mz	CD
Dianil Brown M, MH	Mz	CD
Dianil Brown R	Mz	CD
Dianil Brown X	Mz	CD
Dianil Claret B, G	Mz	CD
Dianil Crimson B, G	Mz	CD
Dianil Dark Blue R, 3R	Mz	CD
Dianil Dark Green B	Mz	CD
Dianil Deep Black, B conc., FF conc., TV conc., BR extra conc.	Mz	CD
Dianil Direct Yellow S	Mz	CD
Dianil Fast Red F	Mz	CD
Dianil Fast Scarlet 8BS	Mz	CD
Dianil Green G	Mz	CD
Dianil Indigo O	Mz	CD
Dianil Japonine G	Mz	CD
Dianil Orange F, G, O, BM	Mz	CD
Dianil Red 4B	Mz	CD
Dianil Scarlet G, 2R	Mz	CD
Dianil Violet H	Mz	CD
Dianil Yellow G, 3G, R, OO, MB	Mz	CD
Dianisidine Blue	By, Mz	Printing
Dianol Black Brown	Lev	CD
Dianol Blue G	Lev	CD
Dianol Brilliant Red extra	Lev	CD
Dianol Brown NB, R, Y, YY	Lev	CD
Dianol Green G	Lev	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Dianol Olive	Lev	CD
Dianol Orange Brown, ABZ	Lev	CD
Dianol Violet 2B, R	Lev	CD
Dianthine, B, G	Lev	CD
Dianthine Pink	BrS	CD
Diazethyl Black B, R	By	CD
Diazine Black BRS	Kell	CD
Diazine Blue B, 2B, R	K	CT
Diazine Brown	K	CT
Diazine Green	K	CT
Diazo Black	K	CT
Diazo Black 2B, BHN, 3B, G, R	By	CD
Diazo Blue B	By	CDv
Diazo Blue Black RS	By	CDv
Diazo Bordeaux, 7B	By	CDv
Diazo Brilliant Black B, R	By	CDv
Diazo Brilliant Scarlet Bex, 3Bex, 6Bex, Gex	By	CDv
Diazo Brown G	By	CDv
Diazo Brown R extra, V	By	CDv
Diazo Deep Blue BB, 3B	By	CDv
Diazo Fast Black	Bal	WGS
Diazo Fast Black BHX, 3B, G	By	CD
Diazo Fast Black SD	By	CDv
Diazo Indigo Blue B, M, BR, extra, 3R, 2RL, 4RL	By	CDv
Diazo Marine Blue B, G	O	CDv
Diazo Navy Blue 3B	By	CDv
Diazo Rubine R	By	CDv
Diazo Violet R	By	CDv
Diazogene B, BB, 3B	By	CDv
Diazurine B, G	Kell	CDv
Diazyl Black	Bs	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Diazyl Brown G, T	Bs	CD
Dimethyl Orange	Bs	CD
Dingley Blue B, 2R	Sch	CD
Dingley Yellow 17	Sch	CD
Dioxine	L	WCh
Diphen Blue B Base, R Base	A	CD
Diphenylamine Blue	Mz.	
Diphenylamine Orange	Klp.	
Diphenyl Black B, DBB, ERF, 3G, R, RR	Kell	CD
Diphenyl Blue B, 2B, BM, DBB, EFR, EFS, 3G, NT, RR	Kell	CD
Diphenyl Blue Black	Kell	CD
Diphenyl Brown B, BY, CB, CG, CGG, R, RR, Y, 3G	Kell	CD
Diphenyl Chrysoine RR, 3G	Kell	CD
Diphenyl Catechine G, R, B	Kell	CD
Diphenyl Citronine G	Kell	CD
Diphenyl Dark Blue R	Kell	CD
Diphenyl Fast Black	Kell	CD
Diphenyl Fast Brown G, GN	Kell	CD
Diphenyl Fast Black	Kell	CD
Diphenyl Fast Yellow G, GG	Kell	CD
Diphenyl Grey	Kell	CD
Diphenyl Green G, GB, 3G, KCG	Kell	CD
Diphenyl Indigo Blue	Kell	CD
Diphenyl Orange GG, RR, ORW	Kell	CD
Diphenyl Phosphine G, conc.	Kell	CD
Diphenyl Red 8B	Kell	CD
Diphenyl Violet R, BC, BV	Kell	CD
Diphenyl Yellow, R, GG, 3G	Kell	CD
Direct Black B	SS	CD
Direct Black BFG	A	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Direct Black GBN, K, G	Klp	CD
Direct Black R	SS	CD
Direct Black X	Bs	CD
Direct Black BK	Klp	CD
Direct Black DR, X	Bs	CD
Direct Black No. 8	A C	CD
Direct Black No. 5062	At	CD, CDv
Direct Blue B	Mz, K, Klp	CD
Direct Blue 2B	SS	CD
Direct Blue 3B	Jy	CD
Direct Blue 3BN	K	CD
Direct Blue 3BX	SS	CD
Direct Blue 5B	HS	CD
Direct Blue G, R	Mz	CD
Direct Blue R	Klp	CD
Direct Blue 2R, 3B, 2R	Jy, SS.	
Direct Blue Black 2B	By	CD
Direct Brilliant Blue BM	Mz	CD
Direct Brilliant Orange BO	L	CD
Direct Brilliant Orange M	Mhy	CD
Direct Brown BB	Bs	CD
Direct Brown BL	BL	CD
Direct Brown BS, GS, RS	Kell	CD
Direct Brown GG	By	CD
Direct Brown GX	Bs	CD
Direct Brown J	Klp	CD
Direct Brown M	SS	CD
Direct Brown N	L	CD
Direct Brown NX	Bs	CD
Direct Brown RD, 35	BL	CD
Direct Brown R, S	Kell	CD
Direct Brown RS	Kell	CD
Direct Brown SDP	SS	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Direct Brown TB	Mz	CD
Direct Brown TS, TSB	Klp	CD
Direct Brown VX	Bs	CD
Direct Brown 130, 131	HS	CD
Direct Brown 5002	SJW	CD
Direct Buffalo Brown R	Sch	CD
Direct Catechu Brown	NI	CD
Direct Cross Dye Black RH, RS, NM, AM	H	Sulphur
Direct Cross Dye Blue B, R	H	Sulphur
Direct Dark Green	Mz	CD
Direct Deep Black E, R, RW, T, E extra, RW extra	By	CD
Direct Deep Red P	At	CD
Direct Fast Brown B, GG	By	CD
Direct Fast Yellow B, BN	L	CD
Direct Garnet A	BL	CD
Direct Golden Yellow	BL	CD
Direct Gray	Jy	CD
Direct Gray B	Klp, SS	CD
Direct Gray J	SS	CD
Direct Gray N	AC	CD
Direct Gray R	SS, Klp	CD
Direct Gray reddish	Klp	CD
Direct Gray 4R	SS	CD
Direct Green, CP	Klp	CD
Direct Green B, No. 276	AC, SS	CD
Direct Green BX, S	BL	CD
Direct Green C, CB	Mz, Kell	CD
Direct Green CY	Kell	CD
Direct Green G	Jy	CD
Direct Green P, A	Klp	CD
Direct Green Y	Klp	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Direct Green YYC	Sch	CD
Direct Green 177, 228	HS	CD
Direct Indigo Blue A, BN	Klp	CD
Direct Indigo Blue RB	At	CD & CDv
Direct Indigo Blue BK	Klp	CD
Direct Lemon Yellow	Klp	CD
Direct Navy Blue C, SB	Sch	CD
Direct New Blue 4B	A	CD
Direct Olive Y	Sch	CD
Direct Orange	Fi.	
Direct Orange G	HS	CD
Direct Orange KR, KY	Kell	CD
Direct Orange OR, R	Kell	CD
Direct Orange R	SS	CD
Direct Orange 2R	K	CD
Direct Orange Y	SS	CD
Direct Orange 12, 69	HS	CD
Direct Oriol Yellow	Kell	CD
Direct Pink	Sch	CD
Direct Pink B	Jy	CD
Direct Pink G	S	CD
Direct Plum	Jy	CD
Direct Red	A, By, Fi, Kell	CD
Direct Red B	Bs	CD
Direct Red C, B	AC	CD
Direct Red E, T	Kell	CD
Direct Red 5SE	Kell	CD
Direct Red No. 55	HS	CD
Direct Red extra	Jy	CD
Direct Safranine B	By	CD
Direct Salmon	At	CD
Direct Scarlet B, conc.	K	CD
Direct Scarlet G	K	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Direct Scarlet R	K	CD
Direct Sulpho Black RH, RS	H	Sulphur
Direct Tan 5506	HS	CD
Direct Union Black	Jy.	
Direct Violet A, C	Sch	CD
Direct Violet R	Jy	CD
Direct Violet 6 R extra	SS	CD
Direct Yellow	A, Bi, Fi, K, SS	CD
Direct Yellow C	KSS	CD
Direct Yellow C, P	Klp	CD
Direct Yellow BSR, BLR	At	CD
Direct Yellow G	AC, K, SS	CD
Direct Yellow 2G, 3G	K	CD
Direct Yellow NW	BL	CD
Direct Yellow R	AC, By	CD
Direct Yellow R extra	By	CD
Direct Yellow S	Sch	CD
Direct Yellow T	Klp	CD
Direct Yellow 443	FGB	CD
Direct Yellow 9673	Jy	CD
Discharge Black AF	Mz	WGS, SS
Disulphine Blue G	H	WGS
Domingo Alizarine Black, BG, RB	L	WGSCh
Domingo Alizarine Blue G, R	L	WGSCh
Domingo Alizarine Brown B, G	L	WGSCh
Domingo Black LK.....	L	WGS
Domingo Blue Black R, B	L	WGS
Domingo Blue P, N, BB	L	WGS
Domingo Chrome Black MFF, O, OO	L	Special
Domingo Chrome Brown	L	WACH
Domingo Chrome Red G	L	Special
Domingo Chrome Yellow G	L	Special
Domingo Green 3G, H	L	WCH

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Domingo Seal Brown	L	WACH
Dominion Yellow O	At	CD
Double Brilliant Scarlet G, 2B, BR	A	WGS
Double Brilliant Scarlet 3 R	By	WGS
Double Green S, F	K.	
Double Ponceau 2R, 3R, 4R	By	WGS
Double Scarlet	K	WGS
Double Scarlet extra S	A	WGS
Double Scarlet G	tM	WGS
Double Scarlet R	Lev	WGS
Double Scarlet 2R	tM	WGS
Durophenine Brown V	Cl Co	CD
Eboli Blue	LBs	WG, CD
Eboli Blue B	L	CD
Eboli Green B, G	L, Kl p	CD
Eboli Sky Blue	L	CD
Ebony Black	Klp	CD
Ecarlate B	SS	CD
Ecarlate J, JJ, V	RF	WGS
Ecarlate Brilliante	RF	CD
Ecarlate Croceine 3B	Mo.	
Echurine	LM.	
Eclipse Black B, H	Kell	Sulphur
Eclipse Blue B, R	Kell	Sulphur
Eclipse Bronze	Kell	Sulphur
Eclipse Brown 3G, V	Kell	Sulphur
Eclipse Corinth G	Kell	Sulphur
Eclipse Dark Brown	Kell	Sulphur
Eclipse Green GP	Kell	Sulphur
Eclipse Olive	Kell	Sulphur
Eclipse Phosphine GG, R	Kell	Sulphur
Eclipse Yellow G, 3G	Kell	Sulphur
Elgene Base B	A	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Elgene Blue	A	CT
Emerald Green Crystals	PK, Bt, By	WG, SA, CT
Emin Red	A	WGS
Empire Black B, G	At	WACH
Empire Orange G	Bch.	
English Yellow		WGS
Eosamine B	A	WGS
Eosine A	PK	WA, SA
Eosine A conc., 2A, AG, A6G	Mz	WA, SA
Eosine bluish	Kell	WA, SA
Eosine B	Klp	WA, SA
Eosine BB	Klp	WA, SA
Eosine 3B	Mz	WA, SA
Eosine 10B, BF	Math	WA, SA
Eosine BN	Math, PK	WA, SA
Eosine DH, DHV	Klp	WA, SA
Eosine extra, extra yellow, extra conc., extra BB, AG, A3G, A5G, D	Mz	WA, SA
Eosine Bluish, extra yellow, yellowish	Kell	WA, SA
Eosine G	Math	WA, SA
Eosine GGB, GGF, GGG	Math	WA, SA
Eosine J	PK	WA, SA
Eosine 3J, 4J, extra	Mz	WA, SA
Eosine JJF	Math	WA, SA
Eosine S	PK	WA, SA
Eosine Y	Sch	WA, SA
Eosine 2110, 5765	Math	WA, SA
Eosine Scarlet B	Mz, Math	WA, SA
Eosine Scarlet BB extra	Mz, Kell	WA, SA
Eosine Yellowish	A, BrS, K	WA, SA
Erie Blacks	Sch	CD
Erie Green 235, DB	Sch	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Erie Blue BX	Sch	CD
Erika B, BN, Bex	A	CD
Erika G, G ex	A	CD
Erika 3GN, 2GN	A	CD
Erio Blue BB, G, R, RR	Kell	WGS
Erio Carmine R	Kell	WGS
Erio Chrome Black A, B, BB	Kell	WACH
Erio Chrome Blue R	Kell	WACH
Erio Chrome Bordeaux B	Kell	WACH
Erio Chrome Brown B, G	Kell	WACH
Erio Chrome Olive G	Kell	WACH
Erio Chrome Violet B	Kell	WACH
Erio Chrome Yellow 6G	Kell	WACH
Erio Chrome Yellow G, 3G	Kell	WGSCh
Eriocyanine	Kell	WGS, SS
Erioglaucine	Kell	WGS, SS
Erio Rubine G, 2R	Kell	WGS
Erio Viridine B	Kell	WGS
Erythrine	PK	SA
Erythrine X	PK	WGS
Erythrosine	Br S, Klp, PK	WA
Erythrosine	Mz, PK	WA
Erythrosine, Bluish, Yellowish	Kell	WA
Erythrosine AG	Mz	WA
Erythrosine B, BB	A	WA
Erythrosine blue shade	Mz	WA
Erythrosine BNT, D, DS	Math	WA
Erythrosine extra	Mz	WA
Erythrosine G	PK	WA
Erythrosine yellow shade	Mz, Math	WA
Erythrosine 694	Sch	WA
Ethyl Black 3B, T	B	WGS
Ethyl Blue B	B	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Ethyl Blue BF	Mz	CT
Ethyl Blue BD, RD	Mz	Printing
Ethylene Blue, B, G, R, RR	B	SA
Ethyl Eosine	A, Bt	WGS, SS
Ethyl Green	PK	WGS
Ethyl Purple 6B	O.	
Excelsior Lake Scarlet JN, 2JCN	Math	WGS
Excelsior Black	Math	WGS
Excelsior Black B, G, 5G	Sch	WGS
Fast Acid Black B, 3B	ADC	WGS
Fast Acid Blue B	By	WGS
Fast Acid Blue R, R conc.	Mz	WGS, SS
Fast Acid Eosine G, G extra	Mz	WGS
Fast Acid Fuchsine B	By	WGS
Fast Acid Green B, BN, BS, BZ	Math	WGS
Fast Acid Green BB, extra	Mz	WGS
Fast Acid Magenta G, G conc.	Mz	WGS
Fast Acid Phloxine A, A extra	Mz	WGS
Fast Acid Ponceau	Klp	WGS
Fast Acid Red A	Mz	WGS
Fast Acid Red B	Mz, PK	WGS
Fast Acid Red ER	L	WGS
Fast Acid Scarlet	Klp	WGS
Fast Acid Violet A2R	Mz	WGS, SS
Fast Acid Violet B, BE	Mz	WGS, SS
Fast Acid Violet 10B	By	WGS
Fast Acid Violet R, RBE, RGE	Mz	WGS, WCh
Fast Azo Garnet Base	Mz	Printing
Fast Azo Grenat	Mz	WGS
Fast Black B, BS	B	Sulphur
Fast Black D	Sch	CD
Fast Blue	Mz, Brs	WGS
Fast Blue B for wool	Mz, A, PK	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Fast Blue for Cotton, B, 3B, 3R	Kell	CT
Fast Blue for Cotton, B, 2B, 3B, 4B, 6B, 6B	Mz	CT
Fast Blue for Cotton, B, B2, BR2	A	CT
Fast Blue for Cotton R, 2R, 3R, RB ...	Mz	CT
Fast Blue for Cotton, TAI, TAIH	Mz	CT
Fast Blue 2B for Cotton	A, NI, SS	CT
Fast Blue 5B greenish	Mz	WGS
Fast Blue B, BA, 3B, 6B, for wool	A	WGS
Fast Blue 6B for wool	A	WGS
Fast Blue BN	Math	WGS
Fast Blue BBH	L	CT
Fast Blue Black paste	Mz	CT
Fast Blue Black M paste	Mz	CT
Fast Blue C	Jy.	
Fast Blue D	Mz	WGS
Fast Blue EL	O.	
Fast Blue E, E000	O	WGS
Fast Blue extra greenish	Mz	WGS
Fast Blue FS	Mz	WGS
Fast Blue G	Bd, Bt	WGS
Fast Blue G extra	Mz	WGS
Fast Blue greenish	Mz, PK	WGS
Fast Blue 6G	Math	WGS
Fast Blue N	Sch	WGS
Fast Blue NG, NR	O	WGS
Fast Blue O, OO	Mz, Klp	WGS
Fast Blue OOO	O	WGS
Fast Blue BRG for cotton	A	CT
Fast Blue 3R for cotton crystals	Mz	CT
Fast Blue R	Mz, A, Math, PK.	WGS
Fast Blue R, RA for wool	A	WGS
Fast Blue 2R, 3R, 5R, No. 60	Mz	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Fast Blue, RD, RRD	Math	WGS
Fast Blue III R	S	CT
Fast Bordeaux O	Mz	WCh
Fast Brown	Mz	WGS
Fast Brown 3B, G	A	WGS
Fast Brown N	PK	WGS
Fast Brown ONT yellowish	Mz	WGS, SS
Fast Brown R	Mz, Pk	CD
Fast Brown 25	A	WGS
Fast Chrome Black L, M	H	WACH
Fast Claret	HS, Klp	WGS
Fast Claret Red O	Mz	WGS, SS
Fast Cotton Blue B, 3B, R, RR, 3R ..	Mz	CT
Fast Cotton Brown R	Kell	CD
Fast Cotton Orange 6R extra	Bs	CD
Fast Cotton Yellow 10G	Mz	WG, SA, CT
Fast Dark Blue B	Mz	WGS
Fast Diamine Yellow ARR	Bs	CD
Fast Direct Blue	Mhy	CD
Fast Direct Blue G	Bt	CD
Fast Direct Brown BB, G	Bs	CD
Fast Fulling Blue RR	Bs	CD
Fast Gray B, R	Klp	WCh
Fast Green	O	CT
Fast Green No. 12 paste	Mz	WCh
Fast Green No. 16	Mz	WCh
Fast Green Crystals O	Mz	WCh
Fast Green extra, extra bluish	By	WGS
Fast Green B, CR	By	WGS
Fast Green B	Math	WGS
Fast Green CR	Bs	WACH
Fast Green M, SS.....	By	WGS
Fast Indigo Blue R	Klp	Printing

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Fast Light Green	K	WGS
Fast Light Orange G	By	WGS
Fast Light Yellow, G, 2G, 3G	By	WGS
Fast Milling Red G	Lev	WCh
Fast Mordant Blue B	Mz	WCh, WGSCh
Fast Mordant Yellow G	By	WGS
Fast Navy Blue A, G	PK	CT
Fast Navy Blue GM	O	CT
Fast Navy Blue M	K	WGS
Fast Navy Blue RA	K	CT
Fast Navy Blue RM	O	CT
Fast Navy Blue RN	K	CT
Fast Neutral Violet B	O	CT
Fast New Blue for Cotton	Math	CT
Fast Orange O	Mz	Lakes
Fast Pink B	At	WGS
Fast Pink for Silk	Klp	CD
Fast Ponceau B, 2B	Klp.	
Fast Red	Mz, CDC, A, Klp. . .	WGS
Fast Red A	A, By, K, O, PK ..	WGS
Fast Red B	NI, PK	WGS
Fast Red BT	By, Klp	WGS
Fast Red C	PK	WGS
Fast Red D	O, PK	WGS
Fast Red E	By, PK	WGS
Fast Red E, B	PK, Bs	WGS, SS
Fast Red extra	Kell	WGS, SS
Fast Red 7B	NI.	
Fast Red NS	By	WGS, SS
Fast Red O	Mz	WGS
Fast Red R	AC	WGS
Fast Red RC	Sch	WGS
Fast Red RR, RY	PK	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Fast Red S	Mz	WGS, SS
Fast Scarlet, B	K	WGS
Fast Silk Gray O	Mz	SS
Fast Sulphon Violet 4R, 5BS	S	WGS
Fast Violet	Klp	WCh
Fast Violet B	Mz	WCh
Fast Violet bluish, reddish	By	WGS
Fast Wool Blue A	A	WGS
Fast Wool Blue RL	By	WGS
Fast Yellow	BrS, By, Math, PK,	WGS
Fast Yellow G	Th	CD
Fast Yellow greenish	Bs	WGS
Fast Yellow M	BL	WGS
Fast Yellow R	K	WGS
Fast Yellow S	Mz, Math	WGS
Fast Yellow 4S	SS	WGS
Fast Yellow TS	Mz	CD
Fast Yellow, 1, 2	Sch	CD
Fast Yellow 272	Sch	WGS
Fat Ponceau	Mz.	
Filling Blue	Klp	WCh
Fine New Green Crystals	Bt.	
Fine Violet	Bt.	
Firm Blue	Klp	WGS, SS, CT
Flavanthrene G, R	B	Printing
Flavazine S, L, T, RL	Mz	WGS
Flavazol	A	WGS
Flavinduline	PK	CT
Flavophosphine, G conc., new, 2G conc., new, 4G conc., new, R conc., new	Mz	CT
Flavophosphine, GO new, 2GO new, 4GO new, RPO new, GCO new	Mz	Leather

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Florida Red, B, G, R	L	WGS
Fluoresceine	Mz, Klp, Math, PK ...	
Fluoresceine G, R, 6836	Math	WGS, SS
Fluorescent Blue	Klp, SS.	
Formyl Blue B	Math	WGS
Formyl Violet 4B, 6B, 8B, 10B, S4B, S5B	Math	WGS
Fram Blue G	By	WGS
Fuchsine	Mz, P, By, Klp, Math, O, PK, NI, PS	WG, SS, CT
Fuchsine A	SS	WG, SS
Fuchsine Crystals 685	Sch	WG, CT
Fuchsine FCOOB	Math	WG, SS
Fuchsine S	Mz	WGS, SS, CT
Full Blue O	Klp	WCh
Fulling Black	K	WCh
Fulling Blue	Kell	WGS
Fulling Blue G, R	Mz, Bs	WGS
Fulling Blue JB	Mz	CDv
Fulling Brown JB, JR	Mz	CDv
Fulling Green	At	
Fulling Green JB, JG	Mz	CDv
Fulling Green	Mz, At	WGS
Fulling Red B	Math	WGS
Fulling Red B, FGG, FR, G	Bs.	
Fulling Red JB	Mz	CDv
Fulling Red R	Bs	WCh
Fulling Yellow	Mz	CDv
Fulling Yellow JG, JR	Mz	WGS
Fulling Yellow O	Math	WGS
Fulling Yellow OO	By, Kell	WCh
Fuscanthrene B paste	Pk	Vat

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Gallamine Blue	Kell	WCh
Gallanil Green	Klp	WCh
Gallanil Indigo P, PS	Klp	WCh
Gallanil Violet	Klp	WCh
Gallazin A	DH	WCh
Gallein A paste, R paste, W powder ...	Mz, By, PK	WCh
Gallein paste	Mz	WCh
Gallocyanine BS, DH	Mz, By, PK	WCh
Gallocyanine paste	H	
Gallocyanine paste D	A, K	WCh
Gambine	H	WCh
Gambine B, G, R, Y, YDS, Yellow	H	WCh
Garnet	HS	WGS
Garnet 71031	AC	WCh
Geneva Blue, C, RR	AC	WCh
Geneva Brown	A	
Gentian Blue 6R	Kell	CT
Gentianin	Kell	WGS, CT
Geranium GN	By	WN, CT
Geranine BB, G	Mz, By	CD
Germania Red	Klp	CT
Giroflé	DH	CT
Glacier Blue	Klp	WGS, SS, CT
Glaucol G	L	WGS
Gloria Black B	Math	WSA
Glycine Blue, Corinth, Red	Ki	CD
Golden Brown	BL	CD
Golden Yellow	H	WGS
Gold Orange	Bs, By	WGS, CT
Gold Orange for Cotton	Klp	
Gold S, C	Sch	CD
Gold Yellow	By	WGS, SS
Gold 83	Gt	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Gray B, R	Klp.	
Green resinate A	Math.	
Grenadine	Mz, NI	WG, SA, CT
Grenadine B, BB, G	O.	
Grenat S	PK.	
Guernsey Blue	Mz, O.	
Guinea Bordeaux B	A	WGS
Guinea Carmine B	A	WGS
Guinea Fast Green B, O	A	WGS
Guinea Green B, G, B extra	A	WGS
Guinea Red 4R	A	WGS
Guinea Violet 4B	A	WGS
Half Wool Black B, T	O	CWD
Half Wool Black BN, 2BN, 4BN, 2BNI. B		CWD
Half Wool Black LS	By	CWD
Half Wool Black S	Math	CWD
Half Wool Blue B	Mz	CWD
Half Wool Blue G	Math	CWD
Half Wool Black S, 2B, 3B	Math	CWD
Half Wool Black W	Mz	CWD
Hat Black FC, MC	Math	WGS
Havanna RF VB	Math	CT
Havanna Black TED	AC	CD
Havanna Blue DR, W	AC	CD
Havanna Brown CBB, O, No. 50, No. 61, B, YY	AC	CD
Helianthine	Kell, PK	WGS, SS
Heligoland Blue B, G, GA, GG, R, 2R ..	Jy	CD
Heligoland Brown	NI	CD
Heligoland Red	NI	CD
Heligoland Yellow	NI	CD
Helio-Orange GL, RL	By	Lakes
Helio Purpurine 4BL, 7BL, GL	By	Lakes

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Heliotrope	Mz, A, By	CD
Heliotrope Tannin	Math	CT
Heliotrope B	Mz, A, By, K	CD
Heliotrope 2B	Mz, A, By, K	CD
Helvetia Blue	Kell	WGS, CT
Hessian Acid Red L	L	CD
Helvetia Green	Bs.	
Hessian Bordeaux	Mz	CD
Hessian Brilliant Purple	Mz, A, By	CD
Hessian Brown, BB, MM	Bs	CD
Hessian Orange	L	CD
Hessian Purple, B, D, N	Mz, A, By	CD
Hessian Violet	Mz, A, By	CD
Hessian Yellow	Mz, A, By	CD
Hoechst New Blue	Mz	WGS
Hofmann's Violet	KB	WG, SS, CT
Hofmann's Violet N	SS	CT
Homophosphine G	L	CT
Hydrazine Yellow O	O	WGS
Hydroleine Induline, Marine R, Primul. RE		
Immedial Black FF extra, G extra, NV		
extra, NB, NG, 2 extra, BF conc.,		
NBB, NN conc., NNR, NNG	Math	Sulphur
Immedial Blue	Math	Sulphur
Immedial Blue C	Math	Sulphur
Immedial Bordeaux G conc.	Math	Sulphur
Immedial Brilliant Black B	Math	Sulphur
Immedial Bronze S	Math	Sulphur
Immedial Brown B, 2R, BR	Math	Sulphur
Immedial Catechu, BG	Math	Sulphur
Immedial Dark Brown A, D conc.	Math	Sulphur
Immedial Dark Green B	Math	Sulphur
Immedial Direct Blue B, OD, JB	Math	Sulphur

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Immedial Green BB ex, GG ex	Math	Sulphur
Immedial Indone R, RB conc., RG conc., RR conc., BF conc., 2BF conc.	Math	Sulphur
Immedial Maroon B conc.	Math	Sulphur
Immedial New Blue G conc.	Math	Sulphur
Immedial Olive B	Math	Sulphur
Immedial Orange C	Math	Sulphur
Immedial Sky Blue	Math	Sulphur
Immedial Yellow D	Math	Sulphur
Imperial Black	At	WGS
Imperial Green Crystals	Bt.	
Imperial Scarlet	By	WGS
Imperial Violet Crystals	At	WGS
Indalizarine	DH	WCh
Indamine Blue N, NB, N extra R	Mz	CT
Indamine Gray	NI.	
Indamine 3R, 6R, TD	NI	CT
Indathrene, C, S, X, CD	B	Printing
Indazine, M, MT, P	Math	CT
Indazurine B, BB, GM, SGM, RM, TS ..	B C F.	CD
Indian Yellow	By	WGS, SS
Indian Yellow G, R, FF	Math	WGS
Indigen Blue BB, R	Klp	CD
Indigene D, F	By.	
Indigo Blue N	Math	WG
Indigo Blue BNK	Klp	CD
Indigo Blue SGN	S S.	
Indigo Blue RB	Math	WGS
Indigo Extract, Synthetic MLB	Mz	WGS
Indigo MLB	Mz	Vat
Indigo MLBR	Mz	Vat
Indigo MLBRR	Mz	Vat
Indigo Powders 1006	H.	

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Indigo Salt T	K	Printing
Indigo Substitute B, BS, pat	Mz	WGS, SS
Indigo Synthetic	B, M	Vat
Indigo Synthetic MLB, 20% paste, 100% powder	Mz	Vat
Indigotine A, B	Sch	WGS
Indigotine extra L, No. 150	Math	WGS
Indigotine extra L, and No. 1	Klp	WGS
Indigotine O, Synthetic MLB	Mz	WGS
Indigo Vat MLBI, 2, 3	Mz	Dyeing
Indocyanine B, BF, 2R	A	WA
Indoin Blue BB	B	CT
Indo Blue 2B, 2R	By	CT
Indophenol White paste	Klp.	
Indophor	PK.	
Induline	Mz, Bs, By, Math, PK	
Induline B	K.	
Induline BE	SS.	
Induline 6B	A.	
Induline B, R powder	Mz	Printing
Induline NN, JS	PK.	
Induline 2N, 2N greenish, S V	Mz	WGS, SS
Induline R	K.	
Induline Red	SS	WGS
Induline Scarlet	PK	CT
Indumen Blue B	AC	WCh
Ingrain Black	H	CDv
Intense Blue	By	WGS
Iodine Eosine	Mo.	
Irisamine G	Math	CT
Iris Blue	PK.	
Iris Violet	PK.	
Iso Diphenyl Black B, BB, R	Kell	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Iso Rubin	A	WGS, SS, CT
Italian Green	ClCo	CD
Janus Black O, 1, 2	Mz	SA, CDv
Janus Blue B, R	Mz	SA, CDv
Janus Bordeaux B	Mz	CDv
Janus Brown B, R	Mz	SA, CDv
Janus Claret Red B	Mz	CDv
Janus Gray B, BB	Mz	SA, CDv
Janus Green B, G	Mz	SA, CDv
Janus Red B	Mz	SA, CDv
Janus Yellow G, R	Mz	SA, CDv
Jasmine	Kell	WGS, SS
Jet Black R	By	WG, WGS
Jute Black	Mz, Math, O	CT
Jute Black B, 3R	Grie	CT
Jute Black GN	Math	CT
Katigene Black Brown B ext conc., R ext conc.	By	Sulphur
Katigene Black T, SW, 2B, TG, extra, SWR extra, TW extra, ST extra, WR extra, BF extra	By	Sulphur
Katigene Blue B	By	Sulphur
Katigene Blue Black B, 4B, R, NB ex. .	By	Sulphur
Katigene Brilliant Black B, B ex	By	Sulphur
Katigene Brown 2R, 4B	By	Sulphur
Katigene Chrome Blue SG, 5G, 2R	By	Sulphur
Katigene Chrome Brown, 5G	By	Sulphur
Katigene Green 2 Bex, 4B, 2G	By	Sulphur
Katigene Indigo B, R ext, RL ext, CL. extra	By	Sulphur
Katigene Khaki G, ext	By	Sulphur
Katigene Olive, G, GN	By	Sulphur
Katigene Red Brown R	By	Sulphur

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Katigene Violet B	By	Sulphur
Katigene Yellow Brown R, GR, ext	By	Sulphur
Katigene Yellow G	By	Sulphur
Kermesine Orange	Mz	WGS
Ketone Blue 4BN, G, R	Mz	WGS, SS
Ketone Green NN	Klp	WGS
Kiamensi Orange G, RR	At	CD
Kiton Blue	Klp	WGS
Kiton Green	Klp	WGS
Kiton Red S	Klp	WGS
Klondike Black 153	HS	CD
Klondike Black Brown	HS	CD
Klondike Blue 51, 71	HS	CD
Klondike Brown B, G, GG, No. 156 ...	HS	CD
Klondike Olive Brown	HS	CD
Klondike Orange RR	HS	CD
Klondike Red	HS	CD
Klondike Yellow GG, 3G, No. 162	HS	CD
Kresotine Yellow G, R	A, By, O	CD
Kresol Red	PK	
Kryogene Black B, BA, G	PK	Sulphur
Kryogene Blue R	PK	Sulphur
Kryogene Brown B, G	PK	Sulphur
Kryogene Olive	PK	Sulphur
Kryogene Yellow R, G	PK	Sulphur
Lake Red C	Mz	Lakes
Lake Scarlet FR, FRR, FRRR, GG, 2R, 3R	Math	WGS
Lake Scarlet, GRII, GRCL, RL, 2RL, 2RCL, 3RCL, 3291	Mz	WGS
Lanafuchsine SB, SG, 6B	Math	WGS
Lanaglaucine W	Mz	WCh
Laundry Blue B, 1, 2, 3	Math	WGS, SS, CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Lazuline Blue	By	WGS
Leather Black New	Math.	
Leather Black C	Mz	Chrome
Leather Black T	Mz	Tannin
Leather Black TB, TG	Math	Tannin
Leather Brown	Mz, O	Tannin
Leather Yellow	Mz, Bs, Klp	Tannin
Leather Yellow G, GG	Mz	Tannin
Light Blue	SS, tM.	
Light Green	KB.	
Light Green SF, bluish, yellowish	PK	WGS, SS
Lithol Red	PK	Lakes
London Blue, extra	Br S	WGS, CAI
Luzon Black	At	WGS
Lyons Black	FGB	WGS
Lyons Blue O, R, RR	Mz.	
Madison Blue V	At	C D & C Dv
Madras Blue R	At, FTM.	
Madras Blue G	SS	WGS
Madras Blue RR	At	WGS
Magdala Red	Mz, Klp	SA
Magenta	H, Math, Sch,	WG, SA, CT
Magenta Extra Large Crystals, extra yellow, Large Crystals, Small Crystals, Double Refined	Mz	WG, SA, CT
Magenta Large Crystals B	Math	WG, SA, CT
Magenta I	Klp	WG, SA, CT
Magenta Crystals 80408	RH	CT
Malachite Green	A, K, Klp, Math	WN, SA, CT
Malachite Green B	Mz, P, K	WN, SA, CT
Malachite Green BB, 4B	Mz	WN, SA, CT

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Malachite Green Crystals	Mz	WN, SA, CT
Malachite Green G	P K	WN, SA, CT
Malachite Green Ia	Mz	WN, SA, CT
Malachite Green Superior	Mz	WN, SA, CT
Malachite Green No. 12	Mz	WN, SA, CT
Malachite Green Powder	Mz	WN, SA, CT
Malta Blue	SS	CT
Malta Gray, J	SS	CT
Malta Yellow AL	SS	CT
Manchester Brown, EE, PS	Math	CT
Manchester Yellow	Lev, RD	WGS
Manhattan Black BS	A C.	
Manila Brown, M15G	Sch	CD
Mandarine G extra, GR	A	WGS
Mandarine Orange G, extra	Mz	WGS
Marine Blue BI, 2RX, RI	Mz	WN, SA, CT
Marine Blue HH	L	WGS
Marinol Acid Blue R	H	WGS
Marion Red	Mz	Lakes
Maroon S	Mz, PK	WGS, SS
Mars Red G	PK	
Martial Black B	SS.	
Martius Yellow	Mz.	
Mauve	SS	SS
Mazarine Blue B, BG, RNS	AC	WCh
Mazarine Brown WO	AC	WCh
Mekon Yellow G, R	Klp	CD
Melanogen G, T	Mz	Sulphur
Melanogen Black G, T	Mz	Sulphur
Melanogen Blue B, BG	Mz	Sulphur
Melantherin JH	Klp	CD
Melanthrene B paste	B	Vat
Meldolas Blue	Math	CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Melita Blue 6G	L	WGS
Melogen BH	S	CDv
Mercaptol Black	SS	Sulphur
Mercerine Wool Red 10B, G, Y	H	WA
Mercerol Wool Yellow R	H	WA
Meridian Green B	At	CD
Meridian Violet 51	At	CD
Meridian Yellow 000	At	CD
Merino Blue, R	SS.	
Merino Brown	SS.	
Merino Yellow	SS.	
Metachrome Bordeaux	A	Special
Metachrome Brown B	A	Special
Metachrome Mordant	A	Special
Metachrome Orange R double	A	Special
Metachrome Yellow RD, 2RD, D	A	Special
Metamine Blue B, G	Klp	CT
Metanil Red 3B, 3B extra	By	WGS
Metanil Yellow	Mz, A, Bs, By, K, Kell O, Math, PK	WGS
Metaphenylene Blue B, BB	Math	WGS
Metaphenyl Yellow ME	SS	WGS
Methyl Alkali Blue	Mz, K, Kell, Klp, O, PK.	
Methyl Blue	Math, tM	SS, CT
Methyl Blue for Cotton	Mz, O	WGS, SS, CA
Methyl Blue for Silk	Mz, O	SS
Methyl Blue New	Kell.	
Methyl Blue GS	Math.	
Methyl Cotton Blue	Kell	CA
Methyl Diphenylamine Blue	Mz.	
Methylene Blue B	Mz, Kell, O, PK	
		WN, SA, CT
Methylene Blue B conc.	Mz	WN, SS, CT

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Methylene Blue BB	Mz, Sch, A.	WN, SS, CT
Methylene Blue BB conc.	Mz, PK	WN, SS, CT
Methylene Blue BB crystals	CR	WN, SS, CT
Methylene Blue BB, extra	Mz	WN, SS, CT
Methylene Blue powder extra	A, PK	WN, SS, CT
Methylene Blue B, G, B, H	PK	WN, SS, CT
Methylene Blue crystal, chem. pure	Mz	WN, SS, CT
Methylene Blue D, DB, DBB extra, DBB conc., DBB extra conc.	Mz	WN, SS, CT
Methylene Blue D, pure	O	WN, SS, CT
Methylene Blue G	Math	WN, SS, CT
Methylene Blue 4BEE	SS	CT
Methylene Blue 4BEESL	SS	Printing
Methylene Blue RR	O	WN, SS, CT
Methylene Blue 3R, 5R, 6R, D3R, D5R .	Mz	WN, SS, CT
Methylene Blue V	Kell	WN, SS, CT
Methylene Blue, Zinc free, pure	Mz	WN, SS, CT
Methylene Dark Blue 3BN, RBN, pat. .	Mz	WN, SS, CT
Methylene Gray B, BF, G, ND, NF, O, R	Mz	WN, SS, CT
Methylene Green	Kell	WN, SS, CT
Methylene Green B	Mz, By	CT
Methylene Green G, GG, O, extra yellow, yellow conc.	Mz	WN, SS, CT
Methylene Heliotrope O	Mz	WN, SS, CT
Methylene Indigo O	Mz	WN, SS, CT
Methylene Violet	SS	WN, SS, CT
Methylene Violet BN, RRA, 3RAext. .	Mz	WN, SS, CT
Methylene Yellow H	Mz	CT
Methyl Eosine	A, Klp	WN, SS, CT
Methyl Green	A, By, K, Math,	SS.
Methyl Indigo B, R	Mo	Vat
Methylindone B, R	Math	CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Methyl Violet B, 2B	Mz, A, By, Math, NI, O, PK.	
Methyl Violet 2B, c. p.	Mz	WG SA, CT
Methyl Violet 2BC	Sch	WG, SA, CT
Methyl Violet BO	Math	WG, SA, CT
Methyl Violet 3B	Mz, Math, O.	
Methyl Violet 3BD	Math	WG, SA, CT
Methyl Violet 3BO	Bch.	
Methyl Violet 4B	Mz, Math, O	WG, SA, CT
Methyl Violet 4BO	Math	WG, SA, CT
Methyl Violet 5B	Mz, Math, O	WG, SA, CT
Methyl Violet 6B	Mz, Math, O	WG, SA, CT
Methyl Violet 6BO	Mz, K, Math, NI, O, SS	WG, SA, CT
Methyl Violet 6B, chem. pure	Mz	WG, SA, CT
Methyl Violet 6B, crystals	Kell, Klp, PK, WG, SA, CT	
Methyl Violet BSC	Math	WG, SA, CT
Methyl Violet extra	Mz	WG, SA, CT
Methyl Violet OB, OBB, O3B, O4B, O5B, O6B, O3R	O	WG, SA, CT
Methyl Violet R, 2R	Mz, Math ..	SW, WG, SA, CT
Methyl Violet 3R, 4R	Mz, Math ..	WG, SA, CT
Methyl Violet 5R	Mz	WG, SA, CT
Methyl Violet RO	Math	WG, SA, CT
Methyl Violet RSJ	Math	WG, SA, CT
Methyl Violet Superior	Mz	WG, SA, CT
Methyl Violet 72 O	Math	WG, SA, CT

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Methyl Water Blue	PK	WG, SA, CT
Metol Blue	LBF	CD
Mikado Brown B, 3GA, MG	Mz, Bs	CD
Mikado Gold Yellow, 2G, 4G, 6G, 8G ..	Mz, Bs	CD
Mikado Orange G, R, 2R, 3R, 4R, 5R ..	Mz, Bs	CD
Mikado Yellow, 2G, 4G, 6G	Mz, Bs	CD
Milling Blue 2 Rex	Mz	WGS, WGSCh
Milling Blue 85	HS	WGS
Milling Green B	NYB	WGS
Milling Orange	D	WCh
Milling Red E	SS	WGS
Milling Red FFG, FR, G, R	Math	WGS
Milling Red 82	HS	WGS
Milling Scarlet 4R conc., 4 RO	Mz	WA, WACH
Milling Yellow II, O, OO	Math	WGS
Milling Yellow 55	SS	WGS
Milling Yellow 84	HS	WGS
Milling Yellow R	L	WGSCh
Mimosa, YC	Kell	CD
Moline	At	WCh
Montana Brown 3G, M	L	CD
Mordant Yellow G, 3R	PK	WCh
Mordant Yellow O, R	Mz	WCh
Muscarine	Klp	CT
Naccarat	SS	WGS
Nako Black O	Mz	Fur
Nako Brown D, P	Mz	Fur
Nako Red O	Mz	Fur
Nako Yellow O	Mz	Fur
Naphthalene Acid Black S	By	WGS
Naphthalene Black 2B, D	H	WGS
Naphthalene Blue B, 5G	Mz	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Naphthalene Green conc., V	Mz	WGS
Naphthaline Pink or Scarlet, see Mag- dala Red		
Naphthaline Yellow	Mz, Bs, Math	WGS
Naphthamine Blue 2B, 5B, BR, 2R, 3R. K	K	CD
Naphthamine Blue BE, GE	K	CDv
Naphthamine Brown 2B, 6B, R, N, 8B, RB	K	CD
Naphthamine Dark Blue R	K	CD
Naphthamine Direct Black FF	K	CD
Naphthamine Fast Black BE, GE, SE. K	K	CDv
Naphthamine Indigo Blue G, 2B, 5B, 2R, RE	K	CD
Naphthamine Pure Blue G	K	CD
Naphthamine Red H	K	CD
Naphthamine Yellow G	K	CD
Naphthazarine Black	B	WCh
Naphthazarine Blue	Bs	WGS
Naphthazarine Blue B	O	WGS
Naphthazarine Blue O	Bs	WGS
Naphthazarine R, S, B, BE, RE	O	
Naphthine Brown	SS	WCh
Naphthion Red, see Orseille Substitute V		
Naphthine S	SS	
Naphthoacetine Fast Black	Sch	WCh
Naphthocyanine	EP	
Naphthogen Blue 2R, 4R	A	CDv
Naphthol S	Math	
Naphtho Rubine	By	WGS
Naphthol Black B, BDF	Math	Printing
Naphthol Black BB, 3B, 4B, 6B, 12B	Math	WGS
Naphthol Black 4BA	H	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Naphthol Black D	Mz	WGS
Naphthol Black P, NY, SG, 4R	Math	WGS
Naphthol Blue B, D	RE	WGS
Naphthol Blue 2B	PK	WGS
Naphthol Blue G, R	Math	WGS
Naphthol Blue Black A	Math	WGS
Naphthol Brown 193	HS	WGS
Naphthol Green B, OO	Math	WGS
Naphthol Orange	A	WGS
Naphthol Red	SB	WGS
Naphthol Red C	Math	WGS
Naphthol Red O	Mz	WGS
Naphthol Red S, GR	PK	WGS
Naphthol Yellow	Klp	WGS
Naphthol Yellow S	Mz, By, Klp, Math, O PK	WGS
Naphthol Yellow SE	Mz	WGS, SS
Naphthalene Yellow	Math.	
Naphthylamine Black 4BK	By	WA
Naphthylamine Black 6BD	Math	WGS
Naphthylamine Brown	PK	WGS
Naphthylamine Pink	Klp	WGS
Naphthylamine Yellow	K	WGS
Naphthyl Blue	K	WGS
Naphthyl Blue 2B	PK	CD
Naphthyl Blue Black MNY, N, R, SB, S2B, S3B, FBB, FB	Math	WGS
Naphthyl Violet	K.	
Naphthylene Blue R, crystals	By.	
Naphthylene Red	By	CD
Narceine	Klp.	
Navy Blue B	A C, Klp	WGS
Navy Blue BW, H	Klp	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Navy Blue Double conc., DR	O	CT
Navy Blue B, R	Mz	Printing
Navy Blue V	Mz	WGS, SS, CT
Neptune Blue BG, R	PK	WGS
Neptune Green S, SG	PK	WGS
Neptune Green 60	HS	WGS
Nerol Black B, BB, 2G new, 4B, 2BG, 4BG	A	WA
Nerol Blue Black	A	WA
Nerogene D	A	Developer
Neutral Blue	Math	CT
Neutral Blue R, 3R	Mz	WN, WGS
Neutral Fast Violet B	Math.	
Neutral Gray G	A.	
Neutral Red extra	Math.	
Neutral Scarlet	Mz	CT
Neutral Violet extra	Math.	
Neutral Violet O	Mz	SA, WN
Neutral Wool Black B, G	Math	WN, WGS
New Acid Green GX, 3BX	By	WGS
New Acridine Orange G	Bs	CT
New Blue B, BF, D, 110, extra F, G, FL, L, O1114A, R, crystal, R pow- der, 72325	Math	CT
New Blue O	Mz	SS, WGS
New Blue R	Bs, By, Math.	
New Coccine	A, Klp.	
New Coccine O	Mz	WGS, SS
New Coccine R	A	WGS
New Cotton Solid Blue	Klp	CT
New Croceine	PK	CD
New Direct Blue B	A	CD
New Ethyl Blue, B, R, BS, RS	Mz	CT

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
New Fast Belgium Blue F	A C	WCh
New Fast Black	B L.	
New Fast Blue paste, F, H	By.	
New Fast Blue 3R crystals	Mz	CT
New Fast Gray	By	CT
New Fast Green 3B	Klp	CT
New Fast Yellow R	B	WGS
New Fuchsine	Klp	WGS, SS, CT
New Gray	By	WGS, CT
New Green	By	WGS, SS, CT
New Green O paste, powder.	Mz	Printing
New Indigo	Klp	CD
New Magenta	O	WN, WG, SA, CT
New Magenta O	Mz	WN, WG, SA, CT
New Metamine Blue M	Mz	CT
New Methylene Blue BB, F, GG, N, NX, NF, R, 3R, 70721	Math	CT
New Methylene Blue N, NH	Mz	CT
New Methylene Blue F, FR	By	CT
New Methylene Gray B paste G powder.	Mz	CT
New Patent Black B, E	K	WGA _s
New Patent Blue B, 4B, GA	By	WGS
New Patent Silk Blue	By	SS
New Phosphine G	Math	CT
New Red L	K	WGS
New Solid Green BB, 3B	Klp	WGS, SS, CT
New Toluylene Blue B, GG, M, R	O	CD
New Toluylene Brown B, BB, BBO, P	O	CD
New Turmerine T	BrS	CD
New Victoria Black B	By.	
New Victoria Black Blue	By.	
New Victoria Blue B	By	WGS, CT
New Victoria Blue GG	Klp	CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
New Victoria Green	By.	
New Yellow	PK	WGS, CT
New Yellow L	K.	
Niagara Blue 6B	Sch	CD
Niagara Direct Black	Sch	CD
Niagara Union Black	Sch	CWD
Nicholson Blue	Br, S, Klp.	
Nicholson Blue B, 2B, 4B, R, 2R, 3R ..	Mz.	
Night Blue	Klp, PK	WGS
Nigramine	Nil	
Nitrogene Orange	PL	WGS
Nigrophor	B	Printing
Nigrosine, J	SS.	
Nigrosine alcohol soluble	Mz, A, Bs, Kell, Math, NI, SS.	
Nigrosine crystals, E, 73651	Math.	
Nigrosine water soluble	Mz, A, Bs, Klp, K, Kell, Math.	
Nigrosine water soluble No. 10, No. 12 ..	Mz.	
Nigrosine Gray Blue, 1, 2, 3, 4	Mz	WN, SS
Nile Blue A, 2B, NN, R	PK	CT
Nitrazine Yellow	O.	
Nitrazol C	Math.	
Nitrophenine	ClCo	CD, WCh, SA
Nitrosamine Red	PK	CDv
Nitroso Base M 50%	Mz	Printing
Nitroso Blue MRS	Mz	Printing
Non Mordant Cotton Blue	Br. S.	
Nopaline	tM.	
Nyanza Black B	A, Mz	CD
Nubian Black..	HS.	
Oenanthinine	Klp	WGS, SS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Oil Yellow A, B, D	Math.	
Oil Black, Blue, Brown, Green, Orange, Red, Violet	Math.	
Old Scarlet	By	WGS
Oleine	BL.	
Opal Blue	Mz, Br, S, Math.	
Opal Blue superfine, soluble	Mz	WGS, SS, CT
Opaline Black 1602	Bch	CD
Opaline 2G, 5G, R	Gb.	
Oramine Blue R.....	PK	CD
Orange	tM	WGS
Orange Crystals	NYB	WGS
Orange A	Mz, Klp, Math,	WGS, SS
Orange I	Mz, By, K, Klp, Math,	WGS, SS
Orange II	Mz, Klp, Math, SS,	WGS, SS
Orange III	Klp, Math, SS, WGS, SS	
Orange IV	Mz, Bs, Kell, Klp, PK, SS	WGS, SS
Orange ENL, ENZ, extra, 2G	Math	WGS
Orange G	Mz, A, Math, PK, WGS	
Orange GG	Bs, Math.	
Orange GG crystal	Math.	
Orange GRX	PK	WGS
Orange GS	O	WGS
Orange GT, RO	By	WGS
Orange M	Klp	WGS
Orange MG paste	Klp	WGS
Orange MN	Klp	WGS
Orange N	K, Klp, PK	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Orange P	O	WGS
Orange R.....	Mz, Klp, Math, PK,	WGS
Orange RL, RRL, RN		
Orange RR	Math	WGS
Orange TA	Mz	WGS, SS
Orange Y	CDC	WGS
Orange 4	Mz, Math	WGS
Orange 4LL	Mz	WGS, SS
Orcelline		
Orchil Crimson powder	PK	WGS
Orchil Substitute G pat.	Mz	WGS
Oriol Yellow	Kell	CD
Oregon Black	AC	CD
Oregon Blue L, U	AC	WGS
Oregon Pink, Red, Yellow	AC	WGS
Orseille Red A	PK	WGS
Orseille Substitute G	A	WGS
Orseille Substitute N extra	Math	WGS
Orseille Substitute V	A, SS	WGS
Orseille Substitute 3VN	SS	WGS
Orseiline BB	By	WGS
Orseiline B, R	Mz	WGS, SS
Ortho Black 3B	A	WGS
Ortho Cerise B	A	WGS
Ortho Cyanine B, 6G, R	A	WGS
Oxamine Black, BR, MB, MD, MT	PK	CD
Oxamine Blue B, BG, G, BB, BT	F, PK	CD
Oxamine Blue 4B, R	PK	CD
Oxamine Blue 3R, RX, 4R	PK	CD
Oxamine Blue Black BR	PK	CD
Oxamine Copper Blue RR	PK	CD
Oxamine Dark Blue BR	PK	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Oxamine Fast Bordeaux	PK	CD
Oxamine Fast Red F	PK	CD
Oxamine Maroon	PK	CD
Oxamine Red, B, MT	PK	CD
Oxamine Scarlet B	F.	
Oxamine Violet, BBR, GR, GRF, MT, RR	PK	CD
Oxblood 8851	Bs	CD
Oxy Diamine Black A, AM, AT, B, BG, BM, BZ, BZS, CBS, D, N, NF, NR, S0000, NRT, R, RR, SA, S000, W, FFC extra, FFG, AFF, JE, JEL, JB, JW	Math	CD
Oxy Diamine Blue 3R, G, 3G, 5G	Math	CD
Oxy Diamine Brown RM, RO	Math	CD
Oxy Diamine Orange G, R	Math	CD
Oxy Diamine Violet B, G, R	Math	CD
Oxy Diamine Yellow GG	Math	CD
Oxy Diaminogen ED, EF, EN, EM, FF, FFG	Math	CDv
Oxydianil Yellow O	Mz	CD
Oxyphenine Gold	ClCo.	
Oxyphenine Gold G	HS	CD
Paeonine	Kell.	
Palatine Black 4B MM	PK	WGS
Palatine Chrome Black S	PK	WGSCh
Palatine Chrome Blue W2B	PK	WACH
Palatine Chrome Bordeaux	PK	WGSCh
Palatine Chrome Brown	PK	WGSCh
Palatine Chrome Claret	PK	WGSCh
Palatine Chrome Red R, B	PK	WGSCh
Palatine Chrome Violet	PK	WGSCh
Palatine Red	PK	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Palatine Scarlet	PK	WGS
Paper Blues.....	Mz	
Paper Orange OO	Mz	Paper
Paper Scarlet bluish	PK.	
Paper Scarlet Blue and Yellow, 3B, 8086	Mz	Paper
Paper Yellow GGex, Rex.....	By	Paper
Paradiamine Black B, BB	Math	CD
Paramine Brown C, R	CR.	
Paramine Indigo Blue, Navy Blue	CR.	
Paraphenylene Blue R, Violet.....	Bs	CT
Paraphosphine G, R	Math	CT
Paratol Citron	Mz	Lakes
Paratol Chrome Yellow L	Mz	Lakes
Paratol Garnet 2R	Mz	Lakes
Paratol Maroon	Mz	Lakes
Paratol Orange	Mz	Lakes
Paratol Rose	Mz	Lakes
Paratol Red	Mz	Lakes
Paris Violet	SS	CT
Paris Violet 6B, 7B	RE	CT
Parma R paste	S	WCh, CT
Patent Blue A, AJI, B, G conc., J1, J2, N, L, J3, J0, J00, V, superfine, VG, WS, RL, 2RL	Mz	SS, WGS
Patent Dianil Black FF conc. FFA conc., FFC conc., FFT conc.	Mz	CD
Patent Green O, V	Mz	WGS
Patent Marine Blue LE	Mz	WGS
Patent Orange	A	WGS
Patent Phosphine	Klp	CD
Patent Rock Scarlet.. ..	Br. S	CD
Pecora Black	Sch	CD

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Pegu Brown G, DR	Bs	CD
Peri Wool Blue B, G	Math	WGS
Persian Yellow	Kell	WCh
Phenamine Blue B, G, R	PK	WGS
Phenedine Brown, Y, 2Y, 3 Y	SS	CD
Phenedine Brown By, 2By, 3By	SS	CD
Phenedine Orange J	SS	CD
Phenedine Pink JE	SS	CD
Phenedine Yellow 2A	SS	CD
Phenocyanine, B, D	Klp	Printing
Phenocyanine TB, TV, VS	Klp	WCh
Phenol Black SS	By.	
Phenol Blue Black 3B	By	WGS
Phenol Flavine	O.	
Phenylamine Black 4B, T	By	WA
Phenyl Blue Black N	By	WGS
Phenylene Black	SS	WGS
Phenylene Brown B R	O	CT
Phenylene Red B	SS	SA
Phenylene Violet B, R	SS	WGS
Philadelphia Yellow G	A	CT
Philochromine B, G paste	Mz	Printing
Phloxine	Mz, Kell, Klp, Math,	WA
Phloxine B, BB	Mz	WA
Phloxine 5B, BA extra, G O, GA ex...	Mz	WA
Phloxine P	P K	WA
Phloxine TA	Mo.	
Phloxine 749	Math.	
Phoenix Red A	Math.	
Phosphine	Mz, Br, S, Kell, Math,	
	NI, PK, SS ...	Tannin
Phosphine 1A, 11A, extra	Math	Tannin

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Phosphine N	K	Tannin
Phosphine P, LM, extra	Mz	Tannin
Pigment Brown	PK.	
Pigment Chlorine GG	Mz	Lakes
Pigment Chrome Yellow L	Mz	Lakes
Pigment Fast Yellow G, R	Mz	Lakes
Pigment Orange R	Mz	Lakes
Pigment Purpurine A	Mz	Lakes
Pigment Red B, R	Mz	Lakes
Pigment Scarlet 3B, G	Mz	Lakes
Pink B R	BL	CD
Pluto Black B, G, R, A, 3B, CR, L conc., TG extra conc., A extra, CF extra,		
F extra, BS extra, SS extra.....	By	CD
Pluto Brown R	By	CD
Pluto Orange G	By	CD
Polychromine B, A	Kell	CDv
Polyphenyl Black, B, G	Kell	WG, WGS
Polyphenyl Black GI, RI, T conc., TG conc., TM conc.	Kell	CD
Polyphenyl Orange R extra	Kell	CD
Ponceau B extra	Mz	WGS
Ponceau BO extra BO, BOG	A	WGS
Ponceau Brilliant 4R	Math	WGS
Ponceau G	Mz, Math	WGS
Ponceau 2G	Mz, PK	WGS, SS
Ponceau 4GB	A	WGS, SS
Ponceau GR, GR2, GRCL	Mz	WGS, SS
Ponceau HP	By	WGS
Ponceau J, JJ	Math	WGS, SS
Ponceau R	Mz, A, PK, SS,	WGS, SS
Ponceau 2R, 3R, 2RCL, 3RCL	Mz	WGS, SS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Ponceau 2RS	SS	WGS, SS
Ponceau 3RB	A, PK	WGS, SS
Ponceau 4R	Mz, A, PK	WGS, SS
Ponceau 4RB	A	WGS, SS
Ponceau 5R	Mz	WGS, SS
Ponceau 6R, 6R crystal	Mz, PK	WGS, SS
Ponceau 6RB, 10RB, S extra, SS extra	A	WGS, SS
Ponceau YB	Mz	WGS, SS
Prague Alizarine Yellow G, R	Ki	WCh
Primrose	S.	
Primrose, alcohol and water soluble ...	Klp.	
Primula B, R	Mz	WG, SA, CT
Primuline	Mz, BrS, By, HS, K, Kell, Math, PK.	
Printing Black for Wool	PK	Printing
Printing Blue	A.	
Printing Blue B, H paste powder	R, Math.	
Prune, powder	Mz	WCh
Prune pure	Mz, Math	WCh
Pure Blue	Mz, Klp, Math, PK.	
Pure Blue B S J	Klp	WGS, SS
Pure Blue O conc. double conc.	Mz	WGS, SS, CT
Pure Blue extra crystals	O	CT
Pure Blue V C	SS	SA
Pure Fast Yellow	Math.	
Pure Soluble Blue	Math.	
Purple Blue O	Mz	WGS, SS, CT
Purpuramine DH	DH	CD
Purpurine paste	BaCo, By, PK.	
Pyramine Orange, Y, 3G	PK	CD
Pyrogene Black BD, B, BN, G, GE, GN, FF	Klp	Sulphur
Pyrogene Blue 2R, RM12, R	Klp	Sulphur

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Pyrogene Brown 5G, M, R, V, B, D, O, OK, ORR	Klp	Sulphur
Pyrogene Cutch 2G, R, DG, DR	Klp	Sulphur
Pyrogene Dark Green B, 3B	Klp	Sulphur
Pyrogene Direct Blue R, G	Klp	Sulphur
Pyrogene Gray B, G, R	Klp	Sulphur
Pyrogene Green B, FB, FF, 2G, 3G	Klp	Sulphur
Pyrogene Indigo	Klp	Sulphur
Pyrogene Olive N	Klp	Sulphur
Pyrogene Violet Brown S	Klp	Sulphur
Pyrogene Yellow M, 3R	Klp	Sulphur
Pyrol Black B conc. BB extra conc. G conc. X conc., ROO	L	Sulphur
Pyrol Blue Black	L	Sulphur
Pyrol Bronze	L	Sulphur
Pyrol Brown G	L	Sulphur
Pyronine B, G	Mz, Bs ..	WGS, SS, CT
Pyrosine, B, J	Mo	WGS
Pyrotine Orange	Bs	WGS
Pyrotine RRO	Bs	WGS
Quinoline Blue	G	Special
Quinoline Red	A	Special
Quinoline Yellow, Spirit	Mz, A ..	Special
Quinoline Yellow	Mz, A, By, PK, SS, WGS	
Red B	Math, PK	SW, CD
Red Blue crystals, powder	O	CT
Red C	PK.	
Red for Lake P	Mz	Lakes
Red 785	AC	WGS
Red Violet RS, 4RS, 5R extra, 5RS ..	PK	WGS, SS, CT
Red, Y, YB, YG, Y2G	Mz	WGS, SS
Regina Purple, Violet	BrS.	
Regina Violet, alcohol, water soluble ..	A	WGS, SS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Resinate Blue A	Math.	
Resinate Green A	Math.	
Resinate Red A	Math.	
Resinate Yellow A	Math.	
Resinate Violet A	Math.	
Resoflavine	B	WCh
Resorcine Blue	Mz	Printing
Resorcine Brown	A	WGS
Resorcine Yellow	A, K	WGS
Resorgyl Yellow	RF	CD
Rheonine A, GD	PK	CT
Rhine Blue BH	Jy	CD
Rhodamine B, B extra, 3B, G, G extra	Mz, Klp, PK	WA, SA
Rhodamine 3G, 5G	Klp, PK	WA, SA, CT
Rhodamine 6G, 5G	Klp, PK	WA, SA, CT
Rhodamine 5G, 4G	By	WA, SA, CT
Rhodamine extra B, O, R	Klp	WGS, SS
Rhodamine S	Klp, PK	WGS, SS
Rhodinduline Red B	By	WGS, SS
Rhodinduline Red G, S	By	WGS, SS
Rhodinduline Violet	By	
Rhodinduline 2BR, Pink, RIV	HS	WGS
Rhodine 2G, 3G, 12GF	BCF	WA, SA, CT
Rhoduline Blue R, GG extra	By	CT
Rhoduline Orange N	By	CT
Rhoduline Heliotrope	By	CT
Rhoduline Heliotrope 3B	By	CT
Rhoduline Pink 4B	By	CT
Rhoduline Pure Blue BB	By	CT
Rhoduline Yellow 6G	By	CT
Rocelline	Kell, Klp, Math, SS,	
		WGS, SS
Rocelline N	Mz	WGS, SS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Rock Scarlet YS	BrS.	
Rosanthrene A, B, CB, O, R	Klp	CDv
Rosanthrene Bordeaux	Klp	CDv
Rosazeine O extra B, B extra, 4G	Mz	WA, SA, CT
Rosazine	SS	WGS
Rosafond	RH	CD
Rosazurine, B, BB, G	Mz, By	CD
Rose Bengale	Kell, Math, PK, WA, SA	
Rose Bengale AT	A, PK	WA, SA
Rose Bengale, B, 3B conc., G	Mz	WA, SA
Rose Bengale N	Math	WA, SA
Roseine	BrS.	
Roseline B, G, R	Mz.	
Rosinduline 2B Bluish, G, 2GB	K	WGS
Rosolane B, O, R, T paste	Mz	SA, CT
Rosolane	SS	WGS, SA
Rosopenine	ClCo	CD, WGS, SS
Rosopenine R, ink	ClCo	CD
Rosopenine 4B, 5B, 6B	ClCo	CD
Rosopenine Geranine	ClCo	CD
Roxamine	DH	WGS
Royal Green crystals	Klp.	
Royal Violet R	Mz	CT
Rubidine	KB.	
Rubin, S	A	SA, CT
Ruby small crystals	KB.	
Rubramine	NI	CT
Ruffgallol	PK	WCh
Russia Red B, G	Mz, Math	CT
Russian Leather Red	Math, O.	
Russian Red B, BB, G, GP, N	O.	
Sabol Brown, or palmetto extract	Nat.	
Safraniline	Kell	WGS, SS, CT

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Safranine	Mz, Kell, Klp, Math.	
Safranine AG, AGT extra	K	SA, CT
Safranine AN extra	Mz, Math	SA, CT
Safranine ANF	Mz	SA, CT
Safranine B best	Kell	CT
Safranine B conc.	Mz	CT
Safranine BS	Math	SA, CT
Safranine conc.	Mz	SA, CT
Safranine FB extra	PK	SA, CT
Safranine FF extra No. 0	By	SA, CT
Safranine G	O.	
Safranine G extra	A, Math	SA, CT
Safranine GGF, GGP	Math	SA, CT
Safranine GGS	Mz, Math	SA, CT
Safranine M	O.	
Safranine MN, NY	PK	SA, CT
Safranine NT	Math	SA, CT
Safranine O	Mz, Math	SA, CT
Safranine PK	Math	SA, CT
Safranine Purple	PK	SA, CT
Safranine RS, Resinate	Math	SA, CT
Safranine superfine, bluish, yellowish ..	Kell	SA, CT
Safranine S 150	Math	SA, CT
Safranine T	Math	SA, CT
Safranine Y	BrS, Klp.	
Safrosine	PK	SA, CT
Salacine Black, D, P, PT	K	WGSCh
Salacine Brown B	K	WGSCh
Salicine Red	K	WGSCh
Salicine Yellow, G, 2G	K	CD
Salmon Red	A, NI, PK	CD
Scarlatol B	Mz	Lakes
Scarlet B	Math	

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Scarlet B extra	Mz	WGS, SS
Scarlet Cardinal	PS	
Scarlet EC, FR, FRR, FRRR, for cot- ton	Math	CAI
Scarlet G, GG, GL, GR11, GV	Mz	WGS, SS
Scarlet BR	A	WGS, SS
Scarlet GRCL	Mz	WGS
Scarlet NR, NRR	SS	WGS, SS
Scarlet R	Mz, By	WGS, SS
Scarlet RBC	Math	WGS, SS
Scarlet RL	Mz	WGS, SS
Scarlet 2R	Mz, Klp	WGS, SS
Scarlet 2RCL, 3RCL	Mz	WGS
Scarlet RRL	Mz, Math	WGS, SS
Scarlet RVL	Mz	WGS, SS
Scarlet 3R, 3RL, 4R, 5R	Mz	WGS, SS
Scarlet 6R Crystals	Mz	WGS, SS
Scarlet S	Math	WGS, SS
Sea Blue	SS	WGS, CT
Seal Brown G	SS	CD
Serge Blue	O.	
Setocyanine	Kell	SS, CT
Setoglaucine	Kell	SS, CT
Setopaline	Kell	SS, CT
Sevres Blue	S	Printing
Silk Black A	H	SS
Silk Blue	Mz	SS
Silk Blue extra greenish, J8C, IC, T, 5BNOO, T5B, T3B, TB, TR, TRL	O	SS
Silk Gray O	Mz	SA
Silk Induline B	Mz	SS, CT
Silk Scarlet TB	H	SS
Silver Gray N	Math	

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Sky Blue	JB	
Smaragd Green	By	
Solamine Blue B, R, FF	A	CD
Solar Black	AT	CD
Solid Blue	O	
Solid Blue BB, BD, BL, DD, RR.....	AT	CD
Solid Blue BD, BRD, 2BD, 3RD, 6G ..	Math	WGS
Solid Blue BL	At	
Solid Blue R	Math	WGS
Solid Blue 3R	Math	WGS
Solid Brown O yellowish, L, NT	Mz	WGS, SS
Solid Green crystals, O, A1, 72780	Math	
Solid Gray S	Math	
Solid Green G	Klp	
Solid Green J	SS	
Solid Green JJ0, O	Klp	WGS SS, CT
Solid Green O paste	Mz	WCh
Solid Violet	Klp	WCh
Solid Yellow N	SS	WGS
Soluble Blue	Mz, Bs, BrS, Math ..	SS
Soluble Blue A1	O	CT
Soluble Blue B	Bch	
Soluble Blue 8B, 10B	BrS	
Soluble Blue Cl, C3	Sch	CT
Soluble Blue, J, M, 00	O	CT
Soluble Blue R	Sch	CT
Soluble Blue BV, 3B	O	CT
Soluble Blue R	Mz	
Soluble Blue 3R	Mz, O	CT
Soluble Blue SV	Mz	
Soluble Blue XG, XL	BrS	
Sorbin Red, G	PK	WGS
Soudan Red I, II, III, G, R	A	

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Soudan Black 1, 2, 3, B, R, 2R	SS	WGS
Soudan Brown	A	CD
St. Denis Black B	SS	Sulphur
St. Denis Red	SS	CD
Stanley Red	ClCo	WGS, SS
Standard Blue, Brown, Cutch Shade, Fast Blue, Fast Brown, Red, Tan, Yellow, Red, Yellow	Me.	
Sterosine Gray	H.	
Stilbene Orange 4R	ClCo	CD, SS
Stilbene Red	A.	
Stilbene Yellow G, 6G, 8G, 4G	ClCo	CD, SS
Substantive Pink CR	PK	CD
Sudan I, II, III	A, Jb	Special
Sudan G	A, Jb	Special
Sudan Brown	A, Jb	Special
Sulfamine Brown A, B, D 93	Bs	WCh
Sulfanilin Black B, G	K	Sulphur
Sulfanilin Brown P	K	Sulphur
Sulfogen S, MO	L	Sulphur
Sulphin	PK	CD
Sulpho Black	H	Sulphur
Sulpho Black G, R	By	WGS
Sulpho Cyanine G, 3R, 5R, GR	By	WGS, WCh
Sulpho Cyanine Black B, 2B	By	WGS
Sulpho Green	S	WGS
Sulpho Yellow S	K.	
Sulphogene Blue M	At	Sulphur
Sulphon Acid Blue B, R, 3R ext G	By	WGS
Sulphon Azurine D	Mz, By	WA, CD
Sulphon Orange G	By	WGS
Sulphon Yellow G, 5G, R	By	WGS
Sulphon Yellow 5G, R	By	WGS

Year-Book for Colorists and Dyers

Name of Dye.	Agent or Maker.	Dye Method.
Sulphur Black T, T extra, A	A	Sulphur
Sulphur Black 2B ex, TB ex, 4B	A	Sulphur
Sulphur Black L, N, ST	Mz	Sulphur
Sulphur Blue L, extra	A	Sulphur
Sulphur Bronze	Mz	Sulphur
Sulphur Brown G, 2G	A	Sulphur
Sulphur Brown TBG, TBM	Mz	Sulphur
Sulphur Corinth B	Mz	Sulphur
Sulphur Cutch G, R	A	Sulphur
Sulphur Green G extra	A	Sulphur
Sulphur Indigo B	A	Sulphur
Sulphur Yellow R ext	A	Sulphur
Sultan Violet	H	CD
Sun Yellow	Mz, A, By, Kell, Klp.	CD
Superfine Violet	KB	
Superior Violet	KB	
Superior New Green Crystals	KB	
Swiss Black B, BG, B2G, C, DG, D	SW	
Tabora Black R extra	Mz A	CD
Tannin Brown B	Math	CT
Tannin Heliotrope	Math	CT
Tannin Indigo	Klp.	
Tannin Orange R paste, powder	Math	CT
Tartrazine	Mz, Klp, PK	WGS
Tennyson Red	H	
Terra Cotta	BL	WGS
Terra Cotta F, NF, NFG, X	Kell	CD
Terra Cotta R	Kell	WCh
Tetranil Brown R conc.	NYB	CD
Tetrazo Blue, 6B, 4R, RW, BX	NYB	CD
Tetrazo Brilliant Blue BB, RR, 6B	NYB	CD
Tetrazo Brilliant Green J, GDD	NYB	CD
Tetrazo Chlorine Scarlet B	NYB	CD

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Tetrazo Cutch Brown	NYB	CD
Tetrazo Dark Brown	NYB	CD
Tetrazo Indigo Blue D	NYB	CD
Tetrazo Lemon Yellow	NYB	CD
Tetrazo Pink B	NYB	CD
Tetrazo Purpurine R	NYB	CD
Tetrazo Sulphur Black, extra, 2B ext, R extra	NYB	Sulphur
Tetrazo Sulphur Brown G, 3R	NYB	Sulphur
Tetrazo Sulphur Green D, 2Y, 3Y	NYB	Sulphur
Tetrazo Sulphur Indigo B	NYB	Sulphur
Tetrazo Sulphur Yellow		
Tetrazo Yellow CH, R	NYB	CD
Thiamine Yellow	BrS.	
Thiazine Brown G, R	PK	CD
Thiazine Red G, R	PK	CD
Thiazol Yellow 3G, GL	By, A	SA, CT
Thio Brown 2B, R	Bs	CD
Thio Carmine R paste, powder	Math	WGS, SS
Thio Catechine S, 1, 2, 3, 4	SS	Sulphur
Thio Chromogene	Mz, Bs	CDv
Thio Cyanosine	Mo.	
Thio Flavine S	Math	CD
Thio Flavine T	Math	CT
Thiogen Black D	Grie	Sulphur
Thiogene Black NA, NB, T, BB conc., M conc., MR conc., 4B conc., MM conc., BR conc., MMR conc.	Mz	Sulphur
Thiogene Black M liquid, BB liquid, BR liquid	Mz	Sulphur
Thiogene Blue B, R, RR	Mz	Sulphur
Thiogene Brown R, G, GG, GC, GR, GRR, S, RR	Mz	Sulphur

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Name of Dye.	Agent or Maker.	Dye Method.
Thiogene Catechu R	Mz	Sulphur
Thiogene Coal Black O conc.	Mz	Sulphur
Thiogene Cyanine G, O	Mz	Sulphur
Thiogene Dark Blue B, BT, BTL.....	Mz	Sulphur
Thiogene Diamond Black B, V	Mz	Sulphur
Thiogene Gold Yellow A conc., AO	Mz	Sulphur
Thiogene Green B, BL extra, GG, GL extra	Mz	Sulphur
Thiogene Heliotrope O	Mz	Sulphur
Thiogene Khaki O	Mz	Sulphur
Thiogene Orange OG, R, RG, RR	Mz	Sulphur
Thiogene Padding Black M liquid	Mz	Sulphur
Thiogene Rubine O	Mz	Sulphur
Thiogene Violet V, B	Mz	Sulphur
Thiogene Yellow G, GG	Mz	Sulphur
Thion Black BE, TG	K	Sulphur
Thion Blue B, conc.	K	Sulphur
Thion Blue Black G	K	Sulphur
Thion Brown G, R, O	K	Sulphur
Thion Green B	K	Sulphur
Thion Violet Black	K	Sulphur
Thional Black T, TB, TR	S	Sulphur
Thional Bronze	S	Sulphur
Thional Bronze G	S	Sulphur
Thional Dark Brown M	S	Sulphur
Thional Yellow G, 3G	S	Sulphur
Thionol Black GTXAS, BC	Lev	Sulphur
Thionol Green B, 2B, 2G	Lev	Sulphur
Thionine Blue G0	Mz	WN, SA, CT
Thionine Blue 0, 00, 000	Mz	WN, SA, CT
Thio Orange G	Bs	WGS
Thiophenol Black T extra, 2 B ex, 2 R ex.	Klp	Sulphur

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Thio Phloxine	Mo.	
Thio Phosphine J	LP.	
Thio Ruby	Bs	WGS
Thio Vesuvine	Bs	WGS
Thio Yellow G, RM, R	Bs	CD
Titan Black ED	H	CD
Titan Blue B, BBB, S	H	CD
Titan Brown O, R	H	CD
Titan Como G, R, S	H	CD
Titan Gold, Gray, Navy Blue, Navy R, Orange N, Pink, Red, Red 6B, Scar- let C, Scarlet CB, Scarlet D, Scarlet S, Sky Blue, Yellow H, Yellow R, Yellow Y	H	CD
Tobacco Brown G, R	Math	CT
Tolan Red I, II, B	K	WGS
Tolamine Green, Violet	Klp	CD
Toledo Blue O	Bs	CD
Toluidine Blue O	A, O, PK	CT
Toluylene Black G	O	CD
Toluylene Blue B, R	O	CD
Toluylene Bordeaux B	O	CD
Toluylene Brown, G, R	O	CD
Toluylene Dark Blue B, R, GN	O	CD
Toluylene Orange R	Mz	CD
Toluylene Orange G, R, RR	O, A	CD
Toluylene Red or Neutral Red	O	CD
Toluylene Yellow, SG	O	CD
Toraline B, a logwood preparation.		
Triamine Black B, BT, MJ	Klp	CD
Tramine Blue BNW, MJ, MNW, TNW	Klp	CD
Trianisoline	Mo	CT
Triazol Blue BB	O	CD

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Name of Dye.	Agent or Maker.	Dye Method.
Triazol Blue BB, 3R	O	CD
Triazol Brown B, G, GOO, SOOO	O	CD
Triazol Corinth B	O	CD
Triazol Dark Blue B, 3R, GW	O	CD
Triazol Indigo Blue	O	CD
Triazol Red 6B, 10B	O	CD
Triazol Violet R, B new	O	CD
Trisulphon Blues	S	CD
Trisulphon Browns	S	CD
Trona Red 3B, 7B, 2G	By	CD
Tropaeoline D, G	Math	CD
Tropaeoline R, Y, RN, RNP	Math	WGS, SS
Tumerine 914	Math	WGS, SS
Turquoise Blue BB, G	By	CT
Tyemond Orange RY	H	WGS
Tyemond Scarlet SJ	H	WA
Tyemond Scarlet Y	H	WGS
Union Black B, BB, S, P, BG, A	Math	CWD
Union Black SM, BS	Mz	CWD
Union Black B, D, G	H	CWD
Union Blue DC, XX	Math	CWD
Union Blue R	A	CWD
Union Green	Sch	CWD
Union Navy Blue	Sch	CWD
Urania Blue, B	Bs	WGS, SS
Uranine	Mz, A, BrS, Math, PK.	
Ursol D, P	Z, A	Fur
Vacanceine Blue, Scarlet	H.	
Vat Red paste, powder	H	CD
Vesuvine B, BB, 3BM, conc., 4GB conc., extra yellow, O, RV, 2RV, 3R, su- perior	Mz	WG, SS, CT
Vesuvine B	PK	WG, SS, CT

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Victor Black	At	WGS
Victoria Black B, G, 5G	By	WGS
Victoria Black	Mz	Wool
Victoria Blue B	Mz, Kell, Klp, Math, PK	WG, SS, CT
Victoria Blue BS, alcohol soluble	Klp, PK ..	WG, SS, CT
Victoria Blue R, 4R	Kell, Klp, PK, WGS, SS, CT	
Victoria Green 3B	Klp, PK ..	WGS, SS, CT
Victoria Heavy Blue	By	WGS
Victoria Pure Blue	B	WGS
Victoria Rubine G, O	Mz	WGS, SS
Victoria Ruby	Mz	WGS, SS
Victoria Scarlet G, R, 2R, 3R, 4R, 5R, 6R	Mz	WGS, SS
Victoria Violet B, paste	Mz, PK	WCL
Victoria Violet 4BS	Mz, By	WGS
Victoria Violet 8BS, 4BSL	Mz	WGS, SS
Victoria Yellow, A, O	Mz	WGS
Victoria Yellow, conc.	Mz	WGS
Vidal Black S, D	SS	Sulphur
Vidaline Blue, BB, 5B, R, RR	SS	Sulphur
Vidaline Brown B, GG	SS	Sulphur
Vidaline Green	SS	Sulphur
Vigoureux Black I	Mz	Printing
Vigoureux Black S	Math	Printing
Vigoureux Brown B, N, SW, V	Math	Printing
Vigoureux Brown I	Mz	Printing
Vigoureux Gray I	Mz	Printing
Vigoureux Green B	Math	Printing
Vigoureux Red A	Math	Printing
Vigoureux Red I	Mz	Printing
Vigoureux Yellow I	Mz	Printing

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Name of Dye.	Agent or Maker.	Dye Method.
Vital Black	HSV	Sulphur
Violamine B, 3B, G, R, A2R, BE, RGE, RBE	Mz	WGS, SS
Violet APF	SS.	
Violet 5B, 6B	By	CT
Violet R, RR	Mo.	
Violet 7B	KB.	
Violet 0B	AC	WGS
Violet Black	PK.	
Violet 5R	By	WGS, SS, CT
Violet Blue AP	SS	WGS, SS, CT
Violet C	SS	WGS, SS, CT
Violet 4RN	Klp	WGS, SS, CT
Violet 3S0N	SS	WGS, SS, CT
Violet Resinate A	Math.	
Violet 118	HS	WGS
Vulcan Brown D, G	Klp	Sulphur
Walnut Brown A, B	Math	CT
Water Blue	Mz, By, Kell, Klp, Math, O, PK, Sch.	
Water Blue B	Math	SS, CT
Water Blue 3BA, 2BM, BNW	A	SS, CAL
Water Blue 6 B extra	O	CD
Water Blue BS, R, RB	Math	SS, CT
Water Blue R, RC, 2R, ADR, 4RW, 5RW	A	SS, WGS, CAL
Water Blue L	A	SS, WGS, CAL
Water Blue 00	K	SS, CT
Water Rose B	Klp	WGS, SA
Water Soluble Eosine	Klp	WGS, SS
Wood Violet S	PK	WGS
Wool Black	A, PK	WGS
Wool Black B	A, Bs	WGS

Dyestuffs, Makers, and Methods

Name of Dye.	Agent or Maker.	Dye Method.
Wool Black 4B	A, ACW	WGS
Wool Black 4BF	A	WGS
Wool Black 6B	A, BS	WGS
Wool Black 6BW	A	WGS
Wool Black DG, DN	K	WGS
Wool Black GR	A	WGS
Wool Black WC	At	WGS
Wool Blue AF	Fi	WGS
Wool Blue B, 2B, R, 5B	A	WGS
Wool Blue FS	Mz	WN
Wool Blue K	PK	WGS
Wool Blue N, R extra, 5 R, B ex S R ex.	By	WGS
Wool Blue S	PK	WGS
Wool Blue SS	Kell	WGS
Wool Gray	Bs	WGS
Wool Gray, B, B double G, R	Klp	WGS
Wool Green B, BS	By, Klp	WGS
Wool Green S	Klp, PK	WGS
Wool Green SS	Kell	WGS
Wool Induline B	K	
Wool Jet Black 2B, 3B	A	WGS
Wool Printing Black B	L	Printing
Wool Printing Black NB	Mz. Printing.....	
Wool Red B	Math	WGS
Wool Red extra	K	WGSS
Wool Red R, G	PK	WGS
Wool Scarlet 3R	CDC	WGS
Wool Scarlet R, 4R, 37W	Sch	WGS
Wool Violet R	K	WA
Wool Yellow	PK	WGS
Xanthine	Mz, Klp	SS
XL Acid Eosine 3B, 5B	H	WGS
XL Blue	H	WGS

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Name of Dye.	Agent or Maker.	Dye Method.
XL Navy Blue	H	WGS
XL Red	H	WGS
Xylene Blue BS, VS	S	WGS
Xylidine Orange 5572	Math.	
Xylidine Ponceau, see Ponceau 2R.		
Xylidine Red, see Ponceau, 2R.		
Yellow AT	Math	WGS
Yellow Coralline.		
Yellow Fast to Soap	SS.	
Yellow for Leather, O, 2a, 7, 11, G	Mz	Tannin
Yellow Resinate A	Math.	
Yellow T	Klp	WGS, SS
Yellow W	By	WGS, SS
Yellow W R	Klp	CD
Yellow 5183, 521	HS	WGS
Yellow II	Math.	
Yellow N	RH.	
Zambesi Black D	A	CD
Zambesi Black B, BR, D, F, FO	A	CDv
Zambesi Black 2G, NA, V	A	CDv
Zambesi Blue B, BX, R, BX	A	CD
Zambesi Brown G, 2G	A	CD
Zambesi Gray B	A	CD
Zambesi Indigo Blue R	A	CD
Zambesi Pure Blue 4B	A	CD



PART VII

Miscellaneous Notes



Miscellaneous Notes

DYEING BY SPRAYING DYESTUFFS.

A variation on the ordinary method of spraying dyestuffs on to fabrics with a brush cylinder is patented by the Farbwerke vorm. Meister, Lucius & Bruening.

Fig. 1 is a traverse section and Fig. 2 a part front elevation of the apparatus.

A brush cylinder *a* is supplied with a dye solution by a distributing cylinder *b* from two color cylinders *c d*, each consisting of a number of small cylinders on the same shaft, so that each revolves in a separate compartment of a dye trough *e*, thus supplying the distributing cylinder with the same or different colors. The component cylinders of cylinder *d* revolve in sub-divisions of the trough *f* and are so mounted on their shaft that they alternate with the small cylinders, thus the whole surface of the distributing cylinder is supplied with color. In the instance shown in the drawing the wire bristles of the brush cylinder come in contact with a wire screen *h* held in a stretched condition by bars *g* at a short distance in front of the fabric *k*, which may travel over the guides *j*, and after having received the spray may pass through squeezing rollers. The speed at which the fabric and cylinders revolve may vary according to the effect desired; it is preferable, however, for the speed of the fabric to be less than that of the brush cylinder. If the separate dye compartments be supplied with dye solutions of successively greater strength the brush cylinder will receive these different solutions, and on the bristles leaving the screen, a fine spray of dye will fall evenly on the

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travelling fabric, which may thus assume a color uniformly darker from one side to the other according to the strength of the solutions. According to the condition and nature of the material to

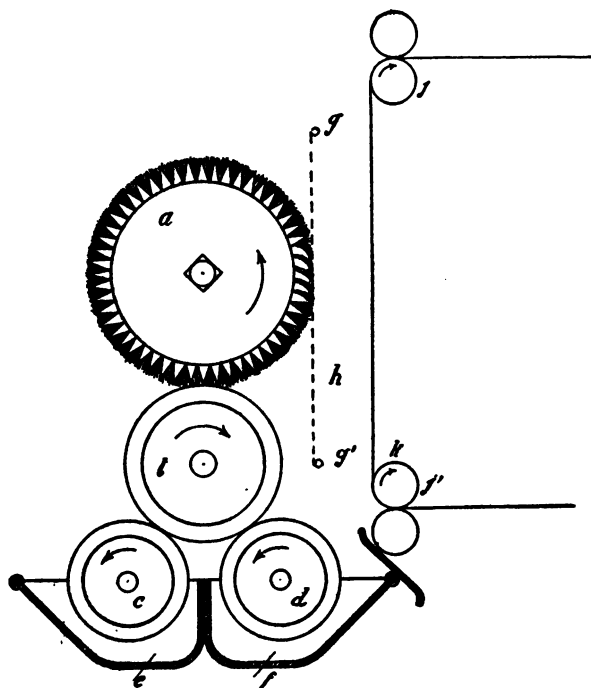


Fig. 1

be dyed, the distance from the screen at which it is placed, the speed of its travel, and of the rotation of the brush cylinder, the pressure on the latter and the quantity of dyestuff applied to it,

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the dyeing of the fabric may be varied in strength. If, for instance, the machine is operated so that comparatively many colors are sprayed on to a feebly moistened piece of woolen fabric which is passed slowly before the brush, the separate drops run completely into each other. On the other hand, if the cylinder is supplied with relatively few colors and a dry paper fabric is passed quickly before it, the paper will be uniformly sprinkled with fine drops, which lie closely together but do not run into each other; the paper will thus receive a coloring which in

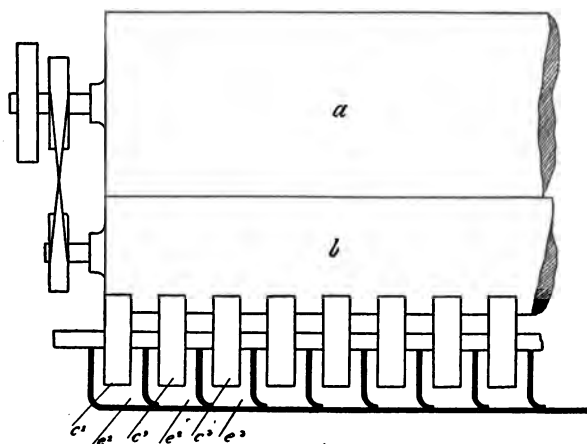


Fig. 2

general aspect will be uniformly shaded. This apparatus may be modified, for instance, by substituting for the two color cylinders one cylinder made up of a number of parts close together. If the distributing cylinder is covered with an absorbent material, such as felt, the narrow strips of its periphery not touched by the color cylinders are nevertheless supplied with color, and no part

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of the fabric remains undyed, because the bristles distribute their spray laterally. The distributing cylinder is not essential, as the brush cylinder may receive the dye solution directly from the color cylinder. For the latter may be substituted, for instance, strips of felt, against which the brush cylinder revolves, and on which the dye solutions drop from the vessels, or the strips may dip at one end into the dye troughs, and at the lower end touch the brush cylinder, thus siphoning the dye solution to the brush cylinder.—*Dyer and Calico Printer*.

DIASTAFOR.

Under the designation "Diastafor," a product is brought into the market by the Deutsche Diamaltgesellschaft, which is intended for use in the textile industries. The commercial product is a fairly stiff paste of a light yellowish brown color, resembling malt extract or commercial diastase in properties. The product is said to be capable of converting five to six times its own weight of starch into sugar, and on this property the various uses for which it is suggested are based. A suitable strength of the solution for bringing about this change is 2-3 lbs. to every 10 gallons water, while the temperature at which the conversion takes place most readily is 140°-150° F. Under these conditions it is pointed out that the starch is completely converted in 30-45 minutes.

Being an extract free from acids and fats, absolutely without action on vegetable or animal fibres or on colors which are fast to washing, readily and completely soluble in water, it is claimed that with convenient manipulation Diastafor combines the possibility of economical application and the certain attainment of good results.

Besides being recommended for the removal of size in the cleansing or bleaching of cotton piece goods, Diastafor may serve for the preparation of soluble sizes for cotton and woolen yarns. It is claimed that warps thus sized possess a good feel, are full, thick and smooth, run easily, and are not dusty.

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The product is also suitable for the preparation of finishes for linen, cotton, wool, silk, etc., piece goods, for the preparation of a soluble starch mixture for starching and getting up new articles in laundry work, and in printing for the improvement of printing colors, giving them better binding powders and adhesiveness to the cloth.

THE REMOVAL OF SIZES AND FINISHES WITH DIASTAFOR.

Soak the fabric for 10 to 15 minutes in hot water, then treat in the Diastafor bath at 140° to 155° F. for $\frac{1}{2}$ to 1 hour, or until the fabric is thoroughly wet out.

The pieces may be merely wet out in the Diastafor bath and allowed to lie $\frac{1}{2}$ to 1 hour to permit the Diastafor to act.

The pieces are then washed, first in warm water and then in cold water.

The Diastafor bath is made by adding 2 to 3 lbs. of Diastafor to 12 gallons of water; that is a 2% to 3% solution. The temperature must be carefully maintained as the action of Diastafor is most powerful and economical in removing finishes at this temperature. Higher temperatures than 155° F. must be avoided as they destroy the activity of the substance. The solution must contain no alkali.

SIZING AND FINISHING MIXTURES FROM STARCH, POTATO FLOUR, ETC., WITH DIASTAFOR.

Potato flour, starch or similar substances are stirred into the necessary amount of cold water, and boiling water added in a thin stream with constant stirring until a homogeneous paste is formed.

Cool the paste to 140° F. and add 2 to 3 lbs. of Diastafor per 100 lbs. of dry starch previously dissolved in lukewarm water. The Diastafor is allowed to act until the mixture has become thin and transparent which takes $\frac{1}{2}$ to 1 hour.

The action of the Diastafor is then stopped by a short boil, or

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the addition of enough soda to make the liquid just alkaline, which point after a little practice can be recognized by the slight yellow coloration produced.

During the action of Diastafor an occasional stirring is needed to prevent the formation of a sediment and to insure complete solution.

After this, are added the other ingredients, such as Epsom Salts, softening, tallow, etc., required to produce the requisite stiffness and handle. The whole mixture is then well stirred.

Where a thicker size or finish is required, it is necessary to add a little softening. The solution may be diluted with warm water if necessary.

SIZE FOR SKEINS.

In 10 gallons of hot water, mix 16½ lbs. wheat flour; dissolve 1 lb. of Diastafor in warm water and stir into the flour mixture. It is advisable to bring the mixture to 140–155° F. as the Diastafor works best at this temperature. Then add ½ lb. of lard and 2 lbs. yellow beeswax. The beeswax must be previously melted and poured in, in a thin stream, to prevent the formation of lumps. Then add 12½ lbs. of Magnesium Chloride and boil hard for 15 minutes. It must be noted that the action of Diastafor is stopped by the boiling. Consequently it must be allowed to exert its solvent action on the wheat flour below 155° F. When the solution of the wheat flour has taken place, the Diastafor is boiled up with the rest of the additions to prevent any other alteration in the consistency of the size.

The size may be diluted with warm water when necessary and is to be used lukewarm. The size must be thoroughly worked into the yarn, and after sizing the yarn must be well brushed and dried at a high temperature.

Skein size prepared with Diastafor has the advantage of thoroughly penetrating the yarn, and does not only paste the outside of the threads but penetrates thoroughly. The yarn is absolutely free from dust.

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RECIPE FOR WARP SIZING.

For the preparation it is best to use a tub, with a stirrer, with pipes to the sizing machine. If this arrangement is not available, the size may be boiled up in a tub and added gradually to the sizing trough.

The threads from the beam are guided separately through the size.

To prepare the size, 25 lbs. of starch are boiled up with 30 gallons of water. To the boiling liquor is added 1 lb. of glue, previously soaked over night in water. When thoroughly mixed, 2 lbs. of tallow are added and the mixture boiled and stirred to secure thorough combination. Allow, stirring all the time, to cool to 55° F. and add 1 lb. Diastafor previously dissolved.

The size is kept at 140° to 155° F. and the threads are passed through the drying and sizing machines on to the beams.

The drying machine must be fairly rapid so that the warps are not stuck together.

The size may be tinted if necessary. For heavy warps, it is advantageous to add a little Japan wax to the size.

FOR DYEING AND FINISHING.

Piece goods are best dyed in the jigger, but if no jigger is available, a winch may be used. Diastafor has here the great advantage, that when it is added directly to the dyebath the color goes on more evenly and gives fuller shades, showing a considerable saving in dyestuff.

The application is as follows:

For every 25 gallons of liquor are added 4 oz., Diastafor dissolved in warm water. Warm the liquor to 155° F. and run the goods through. Then add the mordant or dyestuff and proceed as usual.

SCROOP OBTAINED WITH FORMIC ACID.

For imparting a scroop to cotton yarns, formic acid is distinctly superior to tartaric and to acetic acid. It gives to cotton

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a rustle which is extremely like that of silk, and which is neither too strong nor too weak. Trials have shown that the two washings and a slight steaming leave the feel imparted by formic acid unchanged. As regards time, too, formic acid shows a great superiority. The handle given by it remains unchanged after six weeks, a time which will seriously affect the scroop produced by either tartaric or acetic acid.

To give a scroop to mercerized cotton dyed with basic dyes, proceed as follows: Grond the yarn with 4 per cent. of tannin and a trace of hydrochloric acid, and 2 per cent. of tartar emetic for dark shades, using less tannin and less tartar emetic for lighter shades. Then wash well with weak soap liquor, rinse and dye. After dyeing give a fairly strong soap bath, and liven by adding 8 c.c. of formic acid for every liter of bath. The dye goods will come out fast to washing, and with an excellent feel. If it is desired that the goods should come out stiff from the livening bath, add to that bath 2 per cent. of its weight of glue.

STAINS ON SILK.

Since the process of weighting silk with silico-phosphate of tin has become general, reddish stains have often been noticed. As the stains do not usually appear until the silk has been in stock for a considerable time, and are associated with a great tendering of the fibre where they occur, silk merchants have incurred great loss by reason of these stains. Among the many researches made with a view to discovering their origin, those of Roth, and Thomann, who attribute them to the action of sweat, seem the most convincing. Sisby has shown that common salt, which occurs in perspiration, has an injurious action on silk loaded with silico-phosphate of tin. Meister has confirmed this result, and considers that the stains are due to the joint action of chloride of sodium and copper. The workmen usually have coppers in their pockets, and traces of the metal become transferred to the silk. Analyses of the stained silk have revealed the presence of small amounts of copper. The prophylactic against the stains,

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which are incurable, is a treatment with sulpho-cyanide of ammonium. This method was adopted at a large Swiss silk-dyer's in 1902, and no stains have appeared there since.

FOLDS AND STREAKS IN WOOLENS AND HALF WOOLS.

The causes of creases and streaks in woolens and half wools are very numerous, and it is often difficult or impossible to remedy them. The following remarks are therefore chiefly directed to means for preventing their occurrence.

Warp streaks, due to unequal tension in the warp threads, are very common, and are especially troublesome in weaves where the warp comes much to the surface. The streaks can be felt as well as seen if the fabric is stretched and the fingers are passed over it in the direction of the weft.

Milling is a frequent cause of streaks and creases. Scouring, carbonizing, and neutralizing are also responsible for much of the trouble. In the washing machine, when the goods are scoured and neutralized, the upper roller must not be too heavy. The machine should not be overloaded. If this rule is not followed the goods have no space while in the machine to change their folding, but remain creased as they were put in. The creases thus made are more lasting, and the goods go to the fulling machine with them, and they are still further impressed into the fabric. Frequent passage of the creases between the cylinders and under high pressure naturally makes the creases permanent, especially at the high temperature of the fulling mill.

Many attempts have been made to design fulling machines with arrangements for changing the folding of the goods as they pass through, but although a certain degree of success has been achieved, the fuller must not rely too much upon them. The goods must be frequently stretched during the process, and the motion of the cylinders must be occasionally reversed. The best machine of the improved sort has cylinders in the form of trun-

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cated cones. It is claimed that in passing between these rollers the folding of the goods is constantly being changed, so that no place is kept permanently creased.

Special machinery has been invented for removing milling creases. The principle of all methods is the same. The goods are stretched either on a frame or by being tightly wrapped on a roller, and are then wet steamed or treated with boiling water, and dried without relaxation of the tension.

Careless sewing together of the pieces, end to end, causes streaks which will reach yards from the seam. The sewing must be carefully done with stitches of small and uniform length. Giggling, executed with judgment, may hide certain kinds of streaks, especially those running weft wise.

Heat folds, caused by being left folded up hot for a long time, especially if wet, are very difficult to remove. However it is fortunate that their prevention is easy, as the statement of the cause indicates how they can be avoided.—From *Textile Zeitung*.

ON FASTNESS.

There is no dye which is fast in the absolute sense, either among natural or among artificial products. The colors of flowers, the inimitable beauty of which is so often admired, include some shades never yet produced by the chemist, but these are only fast during a certain part of the life of the plant. They serve their purpose and disappear. Hence it is unreasonable to make over-severe demands upon an artificial dye, and yet we find that some people expect a dye to be fast to air, light, washing, sweat, milling, ironing, wear, rubbing, lime and potting, and tests are often applied which are so rigorous that they destroy fabric and dye together.

The fastest colors, even now, are substances which occur in nature, some of which, however, are now made artificially. There are, nevertheless, many dyes, entirely artificial, which are fast enough for all practical purposes, and in many cases complaints of want of fastness are the result of the employment of unreason-

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able tests. Take, for example, testing for fastness to washing. One person will test by soaking in cold water, another by soaking in lukewarm water, another with boiling water. Others test with hot soap solution, or with hot soap and soda. If any article is boiled for hours in strong lyes, especially if bleaching powder is used, no dye will resist perfectly. The writer has known expensive silk embroidery so handled in the wash that it looked more like jute than like silk. It smelt like acetic acid, and was absolutely guiltless of any lustre, while the feel was greasy and sticky. The dyes had run, and, as an object lesson in bad practice, the article left very little to be desired.

Bleeding is often caused by leaving the goods lying in the soap bath instead of washing and rinsing as quickly as possible. It may be safely said that 95 per cent. of the cases of bleeding in the wash are the fault of the laundry. It is impossible, in the vast majority of cases, to avoid bleeding entirely, but the important thing is to prevent the dye removed from fixing itself in the wrong place. To secure this object the soap bath must not be taken too hot or too strong. One pound of soap to fifty gallons of water at a temperature of from 60° to 75° C., gives a bath sufficiently powerful for any purpose, and if an article, when quickly washed in this and at once rinsed in lukewarm water, shows no change in its colors, the dye may be described as fast to washing. Many complaints are the result of careless rinsing. If any soap is left in the goods, the subsequent processes, ironing especially, are sure to cause stains. The above test is quite severe enough. A dye which will stand it, and yet will not stand the ordeal of the laundry, has been improperly used there. Tests of other kinds of fastness must also be carried out with moderation.

NOTE ON THE ACTION OF HUMAN SALIVA ON BLEACHED COTTON.

If a small piece of bleached cotton be placed in the mouth and allowed to remain there saturated with saliva for a few minutes,

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it does not appear at first sight to have undergone any appreciable change. But if, after having been well washed, the sample is dyed, along with some of the same material untreated, in a direct cotton color such as Benzopurpurine 4B, it will be seen to take up a considerably larger portion of coloring matter from the bath than the latter. The action of the saliva in thus increasing the color-receptive properties of the cotton would appear to be very rapid, the difference in shade being strongly marked, even after the first five minutes. After ten minutes the difference in shade is still more apparent, while after twenty minutes the treated cotton takes up in dyeing, at a rough guess, about twice as much color as the untreated. Similar results were obtained with other direct cotton colors.

The cause of this remarkable phenomenon was not at once apparent. It was at first thought to be due to some of the mucous in the saliva becoming fixed on the fiber, but this was disproved by the fact that the saliva freed entirely from the mucous still showed the same behavior. Experiments carried out with the various salts contained in the saliva, notably potassium sulphocyanide, showed that these, too, possessed no action, while boiled saliva had lost the characteristic property. From these data it would be reasonable to infer that the active constituent of the saliva which brings about the change is the ptyaline, an enzyme which is known to possess, as far as starch is concerned, a most powerful hydrolytic action. Of other enzymes, diastase was also found to have some action, but even under the most favorable conditions it was so slight as to be scarcely appreciable. Possibly other enzymes may exist which equal ptyaline in this respect, and if commercially available, might find employment for the purpose mentioned. So far, the matter is of course of purely scientific interest as far as any treatment of goods in quantity is concerned. The action of saliva might, however, in some cases explain some of the faults in piece goods which dyers so frequently have to contend with.—*Prof. E. Knecht, in Journal Society Dyers and Colorists.*

PART VIII

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